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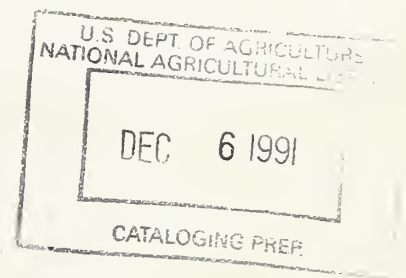
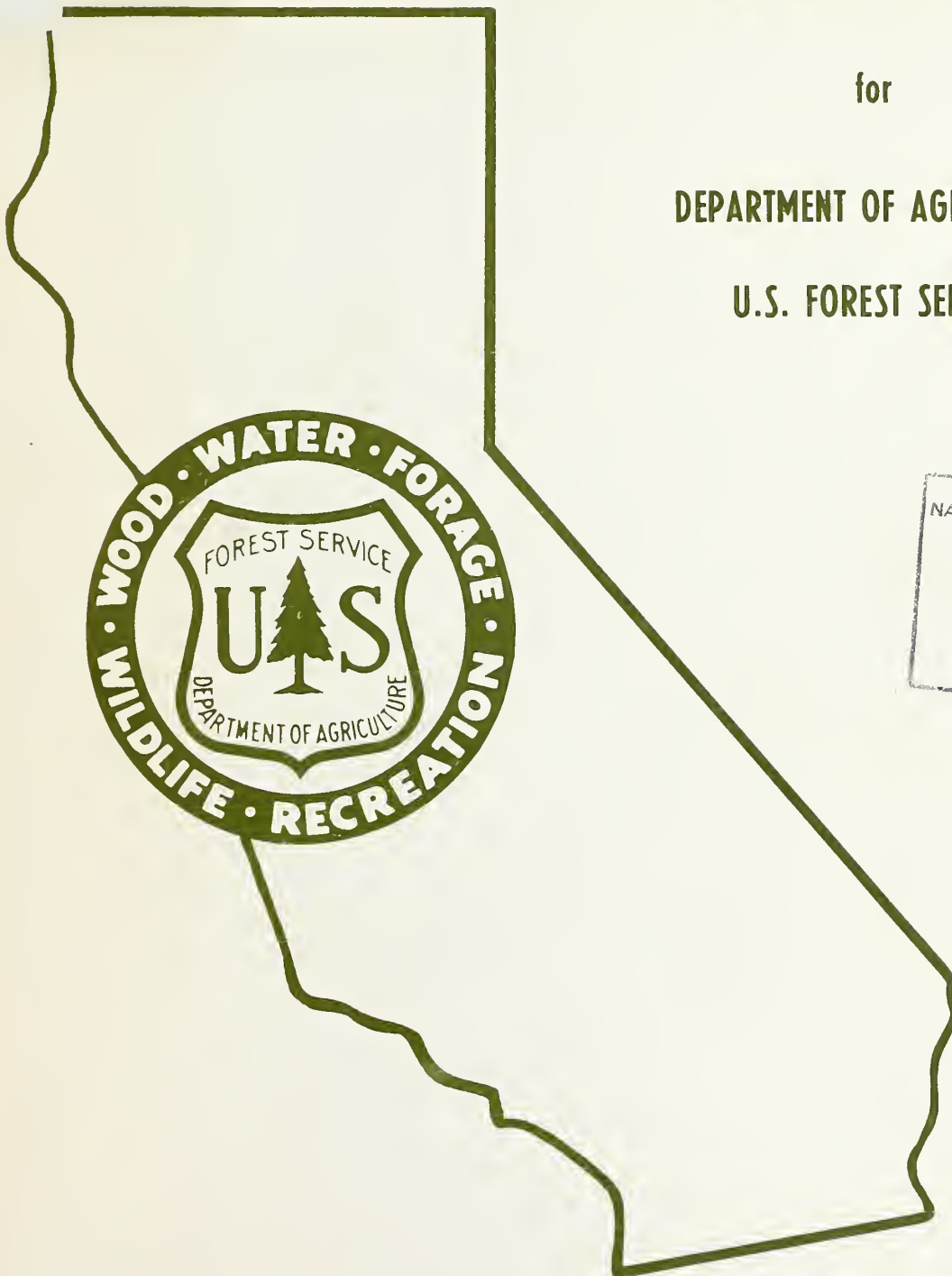
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# DATA COMMUNICATIONS PROPOSAL

for

DEPARTMENT OF AGRICULTURE

U.S. FOREST SERVICE



by: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY

AD-33 Bookplate  
(1-63)

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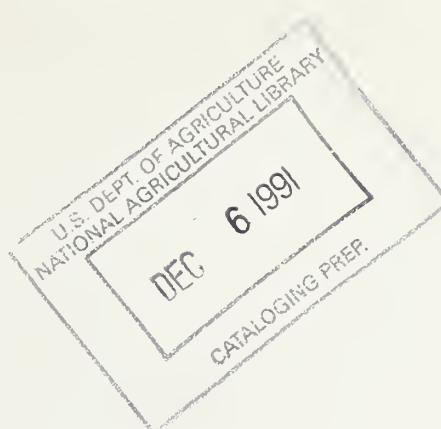
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WHILE VISITING THE FOREST SUPERVISORS' OFFICES, IT BECAME APPARENT THERE WAS A NEED FOR WRITTEN COMMUNICATIONS BETWEEN ALL SUPERVISORY OFFICES AND THE REGIONAL OFFICE LOCATED IN SAN FRANCISCO. WE TELEPHONED MR. LEE HERSKO, ASSISTANT BRANCH CHIEF ADMINISTRATION SERVICES, AND ASKED IF THE PACIFIC TELEPHONE COMPANY COULD MAKE A DATA STUDY FOR THE U. S. FOREST SERVICE AT NO EXPENSE TO THE FEDERAL GOVERNMENT.

MR. HERSKO TELEPHONED M. R. JENKINS OF THE PACIFIC TELEPHONE COMPANY ON JULY 10, 1969 WITH THE APPROVAL FOR A DATA STUDY AT ALL SUPERVISORY OFFICES IN CALIFORNIA AS WELL AS THE REGIONAL OFFICE. THE DATA STUDY WAS STARTED ON JULY 20, 1969 AT THE TAHOE NATIONAL FOREST LOCATED IN NEVADA CITY, CALIFORNIA. THE STUDY WAS CONDUCTED BY TALKING TO EACH DEPARTMENT HEAD ABOUT THEIR OPERATION AND THE PROBLEM AREAS OF THE EVERY DAY JOB. ENCLOSED YOU WILL FIND THE RESULTS OF THAT STUDY.

WE WOULD LIKE TO TAKE THIS OPPORTUNITY TO THANK YOUR PEOPLE WHO WERE MOST HELPFUL DURING THIS STUDY.

12-29-69







## ENGINEERING DESIGN

ENGINEERS STATIONED AT THE FOREST SUPERVISORY OFFICES ARE RESPONSIBLE FOR THE DESIGN OF FEDERAL CONSTRUCTION IN THEIR FOREST. SEVERAL PROGRAMS HAVE BEEN SET UP IN THE COMPUTER TO AID IN THIS WORK.

PRESENTLY, WHEN AN ENGINEER WANTS TO UTILIZE THE COMPUTER FOR COMPUTATIONS, HE MUST FILL OUT A FORM AND MAIL IT TO THE EDP CENTER. WHEN THE FORM ARRIVES IN THE EDP CENTER, IT IS SENT TO THE KEYPUNCH SECTION TO CONVERT THE FORMS TO CARDS FOR INPUT INTO THE COMPUTER.

MANY OF THE ENGINEERS ARE DOING THEIR OWN COMPUTATIONS DUE TO THE TIME DELAY-TWO TO THREE WEEKS. OTHERS ARE LEASING SMALL TABLE TOP COMPUTERS. KEY PUNCHING OF THIS DATA IS PERFORMED AT THE EDP CENTER AT AN ANNUAL COST OF \$22,150.00.

12-29-69





## SCALE TICKETS

SCALE TICKETS ORIGINATE AT SCALE HOUSES LOCATED IN REMOTE LOGGING AREAS THROUGHOUT THE STATE. A SCALE TICKET IS PREPARED FOR EACH LOAD OF LOGS INCLUDING INFORMATION ABOUT THE LOGGING COMPANY, TYPE OF WOOD, LENGTH OF THE LOG, THE DIAMETER OF BOTH ENDS, AND ANY IMPREFECTIONS IN THE LOG.

EACH DAY THE SCALE TICKETS ARE MAILED TO THE COMPUTER CENTER AT THE REGION HEADQUARTERS IN SAN FRANCISCO. THE TICKETS ARE SENT OUT FOR KEY PUNCHING TO A PRIVATE FIRM AT 6.5 CENTS PER CARD. THE CARDS ARE RETURNED THE FOLLOWING DAY FOR PROCESSING IN THE C. D. C. 3100 COMPUTER.

THE COMPUTER FIGURES THE BOARD FEET OF LUMBER CONTAINED IN EACH LOG AND PREPARES A DAILY PRINTOUT WHICH IS MAILED TO THE DISTRICT OFFICES FOR VERIFICATION. EACH MONTH, PRINTOUTS SHOWING THE MONTHLY TOTALS ARE MAILED TO THE SUPERVISORY OFFICES WHERE BILLS ARE PREPARED AND SENT TO THE CUSTOMER.

THIS METHOD IS SLOW AND COSTLY TO THE FOREST SERVICE. THE DELAY IN MAILING THE TICKETS FROM THE REMOTE SCALE LOCATIONS TO THE COMPUTER CENTER IS FROM 3 TO 7 DAYS. ONE DAY DELAY IS ENCOUNTERED IN THE KEY PUNCHING OPERATION. IF ERRORS OCCUR, THIS DELAY IS INCREASED.



THESE DELAYS ARE BOTHERSOME AND EXPENSIVE IN TERMS  
OF ADMINISTRATIVE COSTS TO THE FOREST SERVICE. THE COST OF  
KEY PUNCHING AVERAGES \$85,000 PER YEAR.

12-29-69



## FIRE CONTROL

DURING THE FIRE SEASON VITAL INFORMATION PERTAINING TO MEN AND EQUIPMENT MUST BE RELAYED BETWEEN THE SUPERVISORS OFFICES, ZONE DISPATCH AND REGIONAL FIRE SUPERVISORS OFFICE.

PRESENTLY, THIS INFORMATION IS TRANSMITTED VIA RADIO, ZEROX TELECOPIER, TWX, AND LONG DISTANCE TELEPHONE CALLS.

COMMUNICATIONS DURING FOREST FIRES IS ESPECIALLY CRITICAL. MANY ERRORS CAN AND DO RESULT; SUCH AS, NUMBER TRANSPOSITIONS, MISUNDERSTOOD INFORMATION, ETC.

DURING A FIRE, SUPERVISORS OFFICE CALLS VIA RADIO OR LONG DISTANCE TELEPHONE CALLS TO THE ZONE DISPATCH OFFICE REQUESTING MEN OR EQUIPMENT. THE ZONE DISPATCHER MUST WRITE THIS INFORMATION LONGHAND TAKING UP MUCH OF HIS TIME. THIS FIRE DATA IS TRANSMITTED TO THE REGIONAL FIRE SUPERVISORS OFFICE, STATE OF CALIFORNIA FIRE CONTROL, AND OFFICE OF CIVIL DEFENSE BY TELETYPEWRITER. THERE ARE THREE ZEROX TELECOPIERS, LOCATED AT ZONE DISPATCH, ARCADIA, ZONE DISPATCH, REDDING AND REGIONAL FIRE CONTROL ON AN EXPERIMENTAL BASIS AT PRESENT.

INTEROFFICE ADMINISTRATIVE TRAFFIC IS PRESENTLY DONE BY LONG DISTANCE TELEPHONE OR LETTERS BY U. S. MAIL.



## ACCOUNTING

THE ACCOUNTING OFFICES FORMAT BILLS AND VOUCHERS ON AN APRON AND SEND VIA U. S. MAIL TO THE E. D. P. CENTER FOR PROCESSING. THERE IS APPROXIMATELY 3 TO 5 DAYS DELAY DUE TO SLOW MAIL DELIVERY. THE E. D. P. CENTER SENDS APRON TO THE KEY PUNCH SECTION TO CONVERT APRON TO CARDS FOR COMPUTER INPUT. THERE IS A 2 TO 3 DAY DELAY FOR CONVERSION. THE COST OF KEY PUNCHING BILLS AND VOUCHERS AMOUNTS TO \$38,000.00 ANNUALLY. THE NEW ACCOUNTING COMPUTER CENTER WHICH IS TO BE LOCATED IN COLORADO, COULD CAUSE FURTHER DELAYS DUE TO THE LONGER DISTANCE FOR MAIL DELIVERY.





## ADMINISTRATION

INQUIRIES AND LETTERS ARE SENT BETWEEN THE REGIONAL OFFICES, SUPERVISORY OFFICES AND DISTRICT OFFICES DAILY.

MANY OF THESE INQUIRIES NEED IMMEDIATE ACTION (INFORMATION DESIRED THE SAME DAY). PRESENTLY, INQUIRIES OF THIS NATURE ARE VIA LONG DISTANCE TELEPHONE TO EACH SUPERVISORY OFFICE. THE INFORMATION DESIRED IN MANY CASES LOSE SOMETHING IN TRANSMISSION AND ERRORS RESULT. THIS IS BECOMING COSTLY AND TIME CONSUMING TO THE FOREST OPERATION. INQUIRIES AND LETTERS SENT VIA U. S. MAIL TAKE FROM 3 TO 7 DAYS TO REACH SUPERVISORY OFFICES, THIS IS TOO SLOW AND ALSO COSTLY TO THE FOREST SERVICE CONSIDERING THE AVERAGE COST OF A LETTER IS \$3.00.







## VOLUMES PER CIRCUIT

### EL DORADO FOREST

|               |                        |
|---------------|------------------------|
| Scale tickets | 28,000 words per month |
| Engineering   | 2,000 words per month  |
| Fiscal        | 2,500 words per month  |

### INYO

|               |                       |
|---------------|-----------------------|
| Scale tickets | 6,000 words per month |
| Engineering   | 2,000 words per month |
| Fiscal        | 2,500 words per month |

### KLAMATH

|               |                         |
|---------------|-------------------------|
| Scale tickets | 170,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

### LASSEN

|               |                         |
|---------------|-------------------------|
| Scale tickets | 130,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

### MENDOCINO

|               |                        |
|---------------|------------------------|
| Scale tickets | 30,000 words per month |
| Engineering   | 2,000 words per month  |
| Fiscal        | 2,500 words per month  |

### SIERRA

|               |                         |
|---------------|-------------------------|
| Scale tickets | 120,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |



SIX RIVERS

|               |                         |
|---------------|-------------------------|
| Scale tickets | 100,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

STANISLAUS

|               |                        |
|---------------|------------------------|
| Scale tickets | 20,000 words per month |
| Engineering   | 2,000 words per month  |
| Fiscal        | 2,500 words per month  |

TAHOE

|               |                        |
|---------------|------------------------|
| Scale tickets | 40,000 words per month |
| Engineering   | 2,000 words per month  |
| Fiscal        | 2,500 words per month  |

MODOC

|                |                        |
|----------------|------------------------|
| Scale tickets  | 45,000 words per month |
| Engineering    | 2,000 words per month  |
| Fiscal         | 2,500 words per month  |
| Administrative | 5,000 words per month  |

PLUMAS

|               |                         |
|---------------|-------------------------|
| Scale tickets | 110,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

SAN BERNARDINO

|               |                        |
|---------------|------------------------|
| Scale tickets | 10,000 words per month |
| Engineering   | 2,000 words per month  |
| Fiscal        | 2,500 words per month  |





SEQUOIA

|               |                         |
|---------------|-------------------------|
| Scale tickets | 100,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

SHASTA - TRINITY

|               |                         |
|---------------|-------------------------|
| Scale tickets | 110,000 words per month |
| Engineering   | 2,000 words per month   |
| Fiscal        | 2,500 words per month   |

ANGELES

|                |                       |
|----------------|-----------------------|
| Scale tickets  | - - -                 |
| Engineering    | 2,000 words per month |
| Fiscal         | 2,500 words per month |
| Administrative | 5,000 words per month |

CLEVELAND

|                |                       |
|----------------|-----------------------|
| Scale tickets  | - - -                 |
| Engineering    | 2,000 words per month |
| Fiscal         | 2,500 words per month |
| Administrative | 5,000 words per month |

LOS PADRES

|                |                       |
|----------------|-----------------------|
| Scale tickets  | - - -                 |
| Engineering    | 2,000 words per month |
| Fiscal         | 2,500 words per month |
| Administrative | 5,000 words per month |

TOTAL COMPUTER TRAFFIC

IT IS ESTIMATED THAT THE TRAFFIC INTO THE COMPUTER WILL AMOUNT TO 1,257,000 WORDS PER MONTH WHICH WOULD AMOUNT TO 10.5 HOURS PER DAY FIGURING ON A 20 DAY MONTH AT 100 WORDS PER MINUTE - 3 PORTS INTO THE COMPUTER SHOULD BE ADEQUATE.







## RECOMMENDED SYSTEM

WE RECOMMEND THE INSTALLATION OF A DATA COMMUNICATIONS SYSTEM THAT WILL PROVIDE THE FOREST SERVICE SUPERVISORY OFFICES AND SERVICE CENTERS WITH AN EFFICIENT METHOD OF TRANSMITTING DATA TO THE REGIONAL OFFICE, THE E. D. P. CENTER AND OTHER SUPERVISORY OFFICES.

THIS SYSTEM WOULD GIVE THE SUPERVISORY OFFICE PERSONNEL THE ABILITY TO PREPARE DATA FOR THE COMPUTER IN SAN FRANCISCO IN A MACHINE READABLE FORM. THEY WILL ALSO BE ABLE THROUGH A COMMUNICATIONS ADAPTOR ON THE COMPUTER, TO TRANSMIT THE PREPARED DATA DIRECTLY INTO THE COMPUTER. THIS METHOD OF DATA PREPARATION AND TRANSMISSION WILL GREATLY IMPROVE TURN-AROUND-TIME BY ELIMINATING MAIL AND KEY PUNCHING DELAYS. BY ELIMINATING THE COSTLY KEY PUNCHING OPERATION, THE FOREST SERVICE WILL REALIZE A MAJOR SAVINGS AND A GREATLY REDUCED ERROR FACTOR.

THE SYSTEM WOULD OPERATE AS FOLLOWS --

### SCALE TICKETS

THE SCALE TICKETS WOULD BE SENT FROM THE SCALE HOUSE TO THE SUPERVISORY OFFICE VIA U. S. MAIL OR HAND DELIVERY. UPON RECEIPT OF THE DAYS' TICKETS, AN OPERATOR WOULD PREPARE A PUNCHED PAPER TAPE OFF-LINE ON A MODEL 35 ASR TELETYPEWRITER (SEE SECTION VI). SHE WOULD THEN INSERT THE PUNCHED PAPER TAPE IN THE TAPE TRANSMITTER OF THE 35 ASR AND DIAL THE 2



DIGIT NUMBER OF THE COMPUTER IN SAN FRANCISCO. WHEN THE CALL IS ANSWERED BY THE COMPUTER, AN ANSWER BACK TONE WOULD BE RECEIVED BY THE OPERATOR. SHE WOULD THEN START THE TAPE TRANSMITTER AND SEND THE DATA TO THE COMPUTER AT 10 CHARACTERS PER SECOND. THE DATA WOULD THEN BE STORED BY THE COMPUTER ON MAGNETIC TAPE READY FOR BATCH PROCESSING (SEE SECTION XI).

AFTER PROCESSING, THE REPORTS WOULD BE MAILED TO THE DISTRICT AND SUPERVISORY OFFICES AS THEY ARE TODAY.

HOWEVER, IF THE RESPONSE SYSTEM SUGGESTED BY TRANS-DATA COMPANY IS PURCHASED, THE RESPONSE OPERATION WOULD BE AS FOLLOWS:

A MAGNETIC TAPE WOULD BE PREPARED BY THE CDC 3100 COMPUTER CONTAINING THE RESPONSE MESSAGES AND ADDRESSES (STATION NUMBERS) OF THE LOCATIONS TO BE CALLED.

THIS TAPE WOULD BE PLACED ON THE TAPE DRIVE ASSOCIATED WITH THE COMMUNICATIONS CONTROLLER.

THE COMMUNICATIONS CONTROLLER WOULD RESPOND TO THE ADDRESS ON THE TAPE AND WITH THE ASSISTANCE OF THE BELL SYSTEM AUTOMATIC CALLING UNIT, CALL THE ADDRESSED LOCATION. WHEN THE ANSWERBACK CODE IS RECEIVED FROM THE CALLED STATION, THE MESSAGE WOULD THEN BE TRANSMITTED AT 10 CHARACTERS PER SECOND. THE CALLED STATION WOULD RECEIVE A PAGE COPY OF MESSAGE ON THEIR 35 ASR. WHEN THE MESSAGE IS COMPLETED, THE NEXT STATION WOULD BE ADDRESSED AND THE CYCLE CONTINUED UNTIL ALL MESSAGES ON THE TAPE ARE TRANSMITTED. THIS COULD BE DONE AT NIGHT WHEN THERE IS VERY LITTLE TRAFFIC SINCE THE 35 ASR DOES NOT HAVE TO BE ATTENDED





ON INCOMING MESSAGES.

#### ENGINEERING

ENGINEERS WOULD PREPARE THE FORMS USED FOR COMPUTER ASSISTANCE AS THEY DO TODAY AND GIVE THEM TO A CLERK TRAINED TO OPERATE THE TELETYPEWRITER MACHINE. SHE WOULD PREPARE A PUNCHED PAPER TAPE OFF-LINE ON THE MODEL 35 ASR TELETYPEWRITER (SEE SECTION VI). SHE WOULD THEN INSERT THE TAPE IN THE TAPE TRANSMITTER AND DIAL THE 2 DIGIT NUMBER OF THE COMPUTER. UPON RECEIPT OF THE ANSWER BACK TONE SHE WOULD START THE TAPE TRANSMITTER AND SEND THE INFORMATION TO THE COMPUTER AT 10 CHARACTERS PER SECOND. THE COMPUTER WOULD STORE THE DATA ON MAGNETIC TAPE AS DESCRIBED IN SECTION XI READY FOR BATCH PROCESSING.

AFTER PROCESSING, THE DATA COULD EITHER BE MAILED BACK TO THE SUPERVISORY OFFICE OR IF URGENTLY NEEDED, TRANSMITTED OVER THIS SYSTEM AS DESCRIBED IN ADMINISTRATIVE MESSAGES IN THIS SECTION.

HOWEVER, IF THE RESPONSE SYSTEM SUGGESTED BY TRANS-DATA COMPANY IS PURCHASED, THE RESPONSE OPERATION WOULD BE AS FOLLOWS:

A MAGNETIC TAPE WOULD BE PREPARED BY THE CDC 3100 COMPUTER CONTAINING THE RESPONSE MESSAGES AND ADDRESSES (STATION NUMBERS) OF THE LOCATIONS TO BE CALLED.

THIS TAPE WOULD BE PLACED ON THE TAPE DRIVE ASSOCIATED WITH THE COMMUNICATIONS CONTROLLER.



THE COMMUNICATIONS CONTROLLER WOULD RESPOND TO THE ADDRESS ON THE TAPE AND WITH THE ASSISTANCE OF THE BELL SYSTEM AUTOMATIC CALLING UNIT, CALL THE ADDRESSED LOCATION. WHEN THE ANSWER BACK CODE IS RECEIVED FROM THE CALLED STATION, THE MESSAGE WOULD THEN BE TRANSMITTED AT 10 CHARACTERS PER SECOND. THE CALLED STATION WOULD RECEIVE A PAGE COPY OF MESSAGE ON THEIR 35 ASR. WHEN THE MESSAGE IS COMPLETED, THE NEXT STATION WOULD BE ADDRESSED AND THE CYCLE CONTINUED UNTIL ALL MESSAGES ON THE TAPE ARE TRANSMITTED. THIS COULD BE DONE AT NIGHT WHEN THERE IS VERY LITTLE TRAFFIC SINCE THE 35 ASR DOES NOT HAVE TO BE ATTENDED ON INCOMING MESSAGES.

#### ACCOUNTING

ALL ACCOUNTING DATA CURRENTLY MAILED TO THE COMPUTER CENTER COULD BE TRANSMITTED OVER THIS SYSTEM.

THE DATA WOULD BE PREPARED ON PUNCHED PAPER TAPE OFF-LINE ON A MODEL 35 ASR TELETYPEWRITER (SEE SECTION VI). WHEN READY, THE OPERATOR WOULD PLACE THE PREPARED TAPE IN THE TAPE TRANSMITTER AND DIAL THE 2 DIGIT NUMBER OF THE COMPUTER. UPON RECEIPT OF THE ANSWER BACK TONE THE DATA COULD BE TRANSMITTED DIRECTLY TO THE COMPUTER AND STORED ON MAGNETIC TAPE READY FOR BATCH PROCESSING (SEE SECTION XI).



ADMINISTRATION

THE PROPOSED SYSTEM WILL PROVIDE ADMINISTRATION WITH A NETWORK TO TRANSMIT WRITTEN COMMUNICATIONS TO ANY LOCATION ON THE SYSTEM. IN OUR INVESTIGATION, IT WAS DETERMINED THERE WOULD BE ONE HOUR A DAY ADMINISTRATIVE TRAFFIC FROM EACH SUPERVISORS OFFICE AND 8 HOURS PER DAY FROM THE REGIONAL OFFICE. LETTERS COULD BE SENT BY SENDING A DRAFT TO THE TELETYPE OPERATOR, SHE WOULD PREPARE A PUNCHED PAPER TAPE OFF-LINE ON THE 35 ASR TELETYPEWRITER. SHE WOULD THEN INSERT THE PUNCHED PAPER TAPE IN THE TAPE TRANSMITTER AND DIAL THE 2 DIGIT NUMBER FOR THE DESIRED OFFICE. UPON RECEIPT OF AN ANSWER BACK FROM THE STATION, SHE WOULD START THE TAPE TRANSMITTER AND SEND THE LETTER. IF INFORMATION IS FOR ALL LOCATIONS, (SEE SECTION X 3.25) A DRAFT WOULD BE SENT TO TELETYPE OPERATOR, SHE WOULD PREPARE A PUNCHED PAPER TAPE OFF LINE ON THE 35 ASR TELETYPEWRITER. SHE WOULD INSERT THE PUNCHED PAPER TAPE IN THE TAPE TRANSMITTER AND DIAL A 2 DIGIT NUMBER FOR EACH STATION AS FOLLOWS:

DIAL FIRST STATION; WHEN RECEIVE ANSWER BACK TONE, THE MACHINE WILL CLEAR; DIAL SECOND STATION AND ETC. WHEN ALL DESIRED STATIONS ARE CONNECTED, START TRANSMITTER. THIS WILL SAVE THE FOREST SERVICE TIME AND MONEY BUT JUST HOW MUCH, WE COULD NOT DETERMINE AT THIS TIME.

FIRE CONTROL

THE SYSTEM COULD BE USED FOR TRANSMITTING WEATHER



INFORMATION. THE WEATHER BUREAU WOULD PREPARE A PUNCHED PAPER TAPE CONTAINING THE WEATHER INFORMATION. THEY WOULD THEN, USING THE MULTIPLE ADDRESS FEATURE OF THE 400 DATA PACKAGE (SECTION VIII), CALL THE LOCATIONS REQUIRING THE WEATHER DATA AND TRANSMIT THE INFORMATION TO ALL OF THEM SIMULTANEOUSLY.

DURING A FIRE, THE SYSTEM COULD BE USED FOR TRANSMITTING IMPORTANT FIRE MANIFESTS RELIEVING THE BUSY RADIO FREQUENCIES AND PROVIDING ALL LOCATIONS WITH A WRITTEN COPY OF THE DOCUMENT.

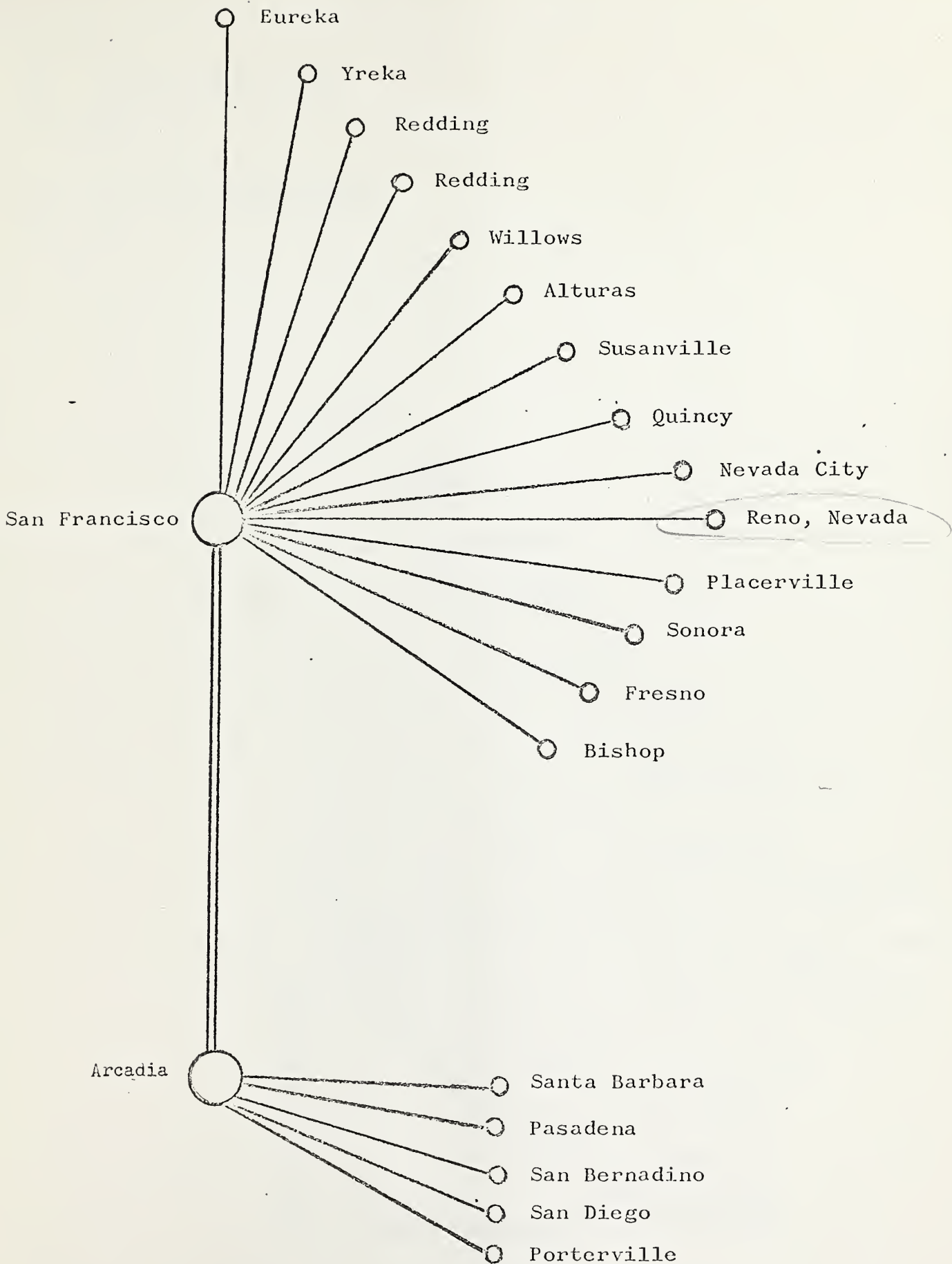
THE 400 DATA PACKAGE IS THE MOST MODERN DATA COMMUNICATIONS SYSTEM AVAILABLE AND IS COMPATABLE WITH ANY DATA PROCESSING SYSTEM. IT WILL BE READILY ADAPTABLE TO ANY SYSTEM WHICH MIGHT BE EMPLOYED BY THE FOREST SERVICE, NOW, AND IN THE FUTURE.











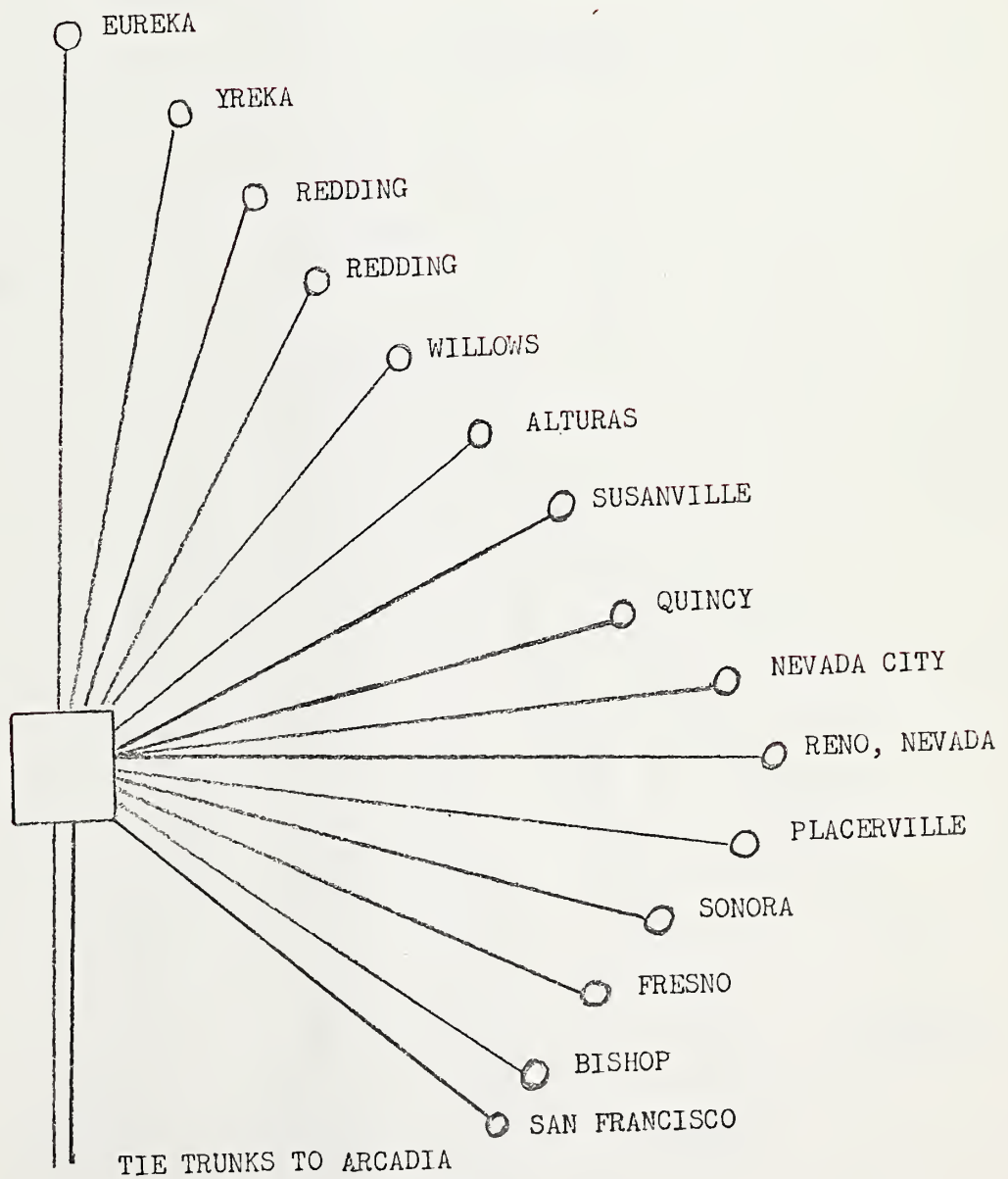




400 DATA PACKAGE



35 ASR TELETYPEWRITER



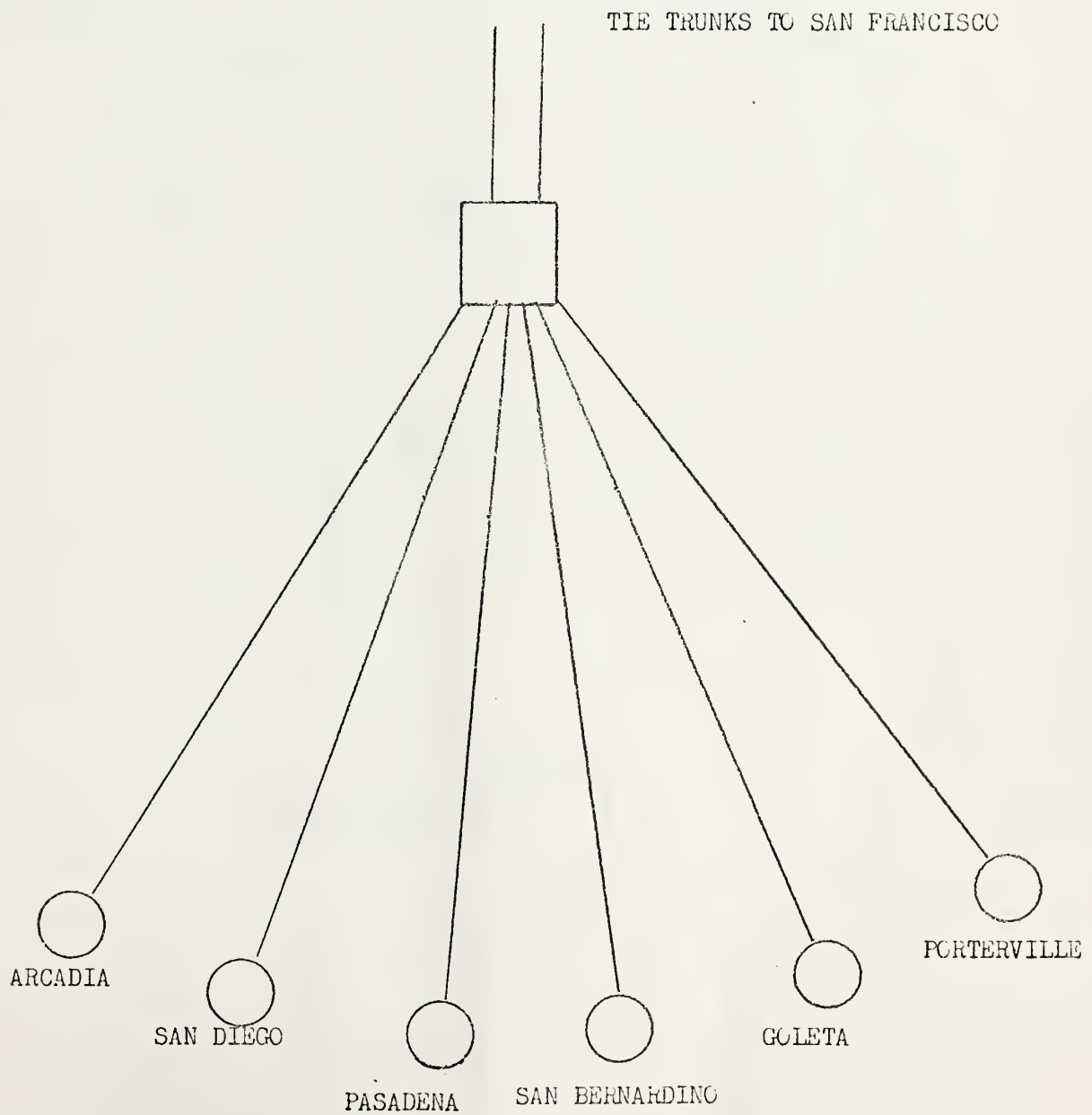




----- 400 DATA PACKAGE



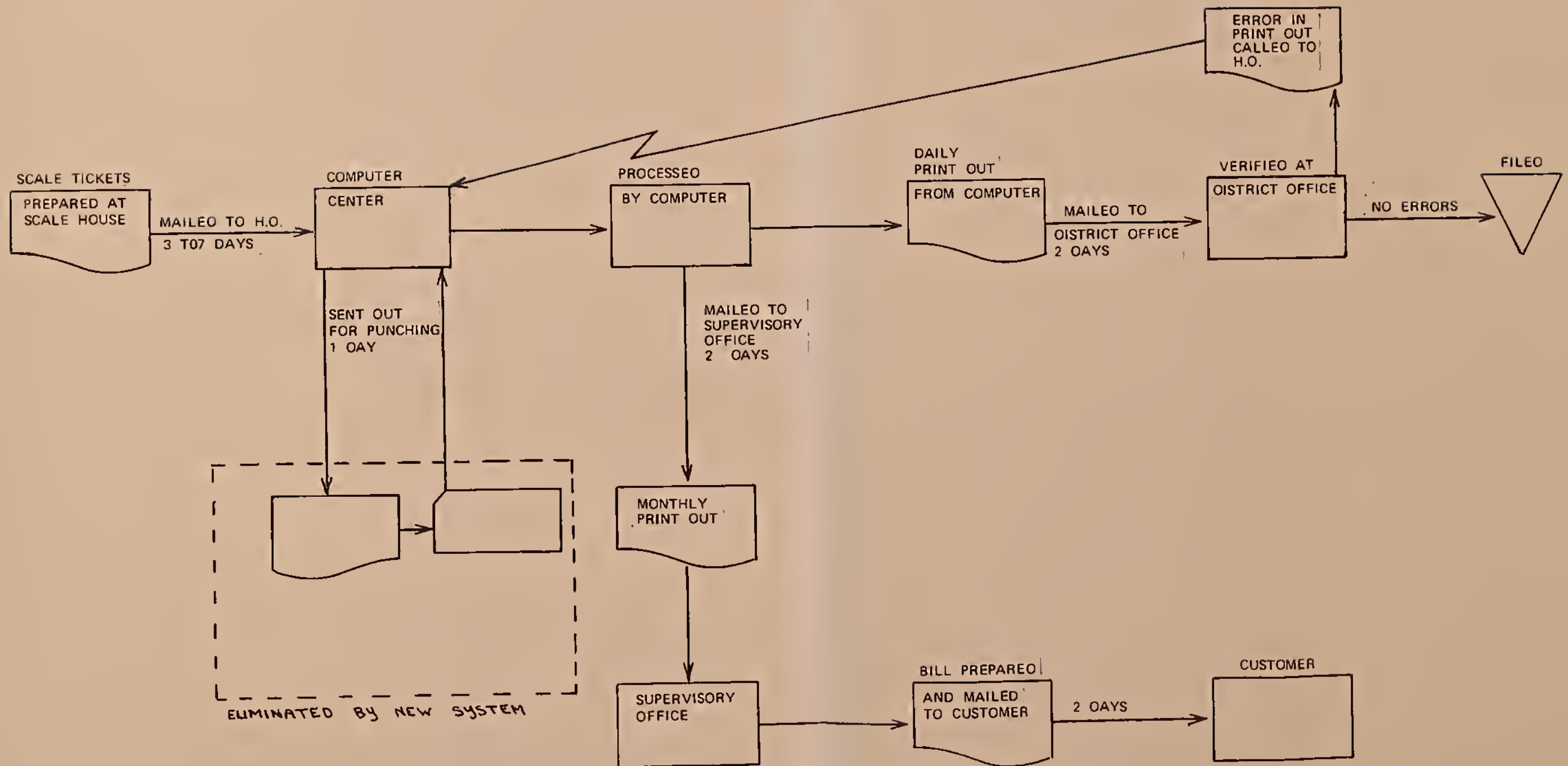
----- 35 ASR TELETYPEWRITER





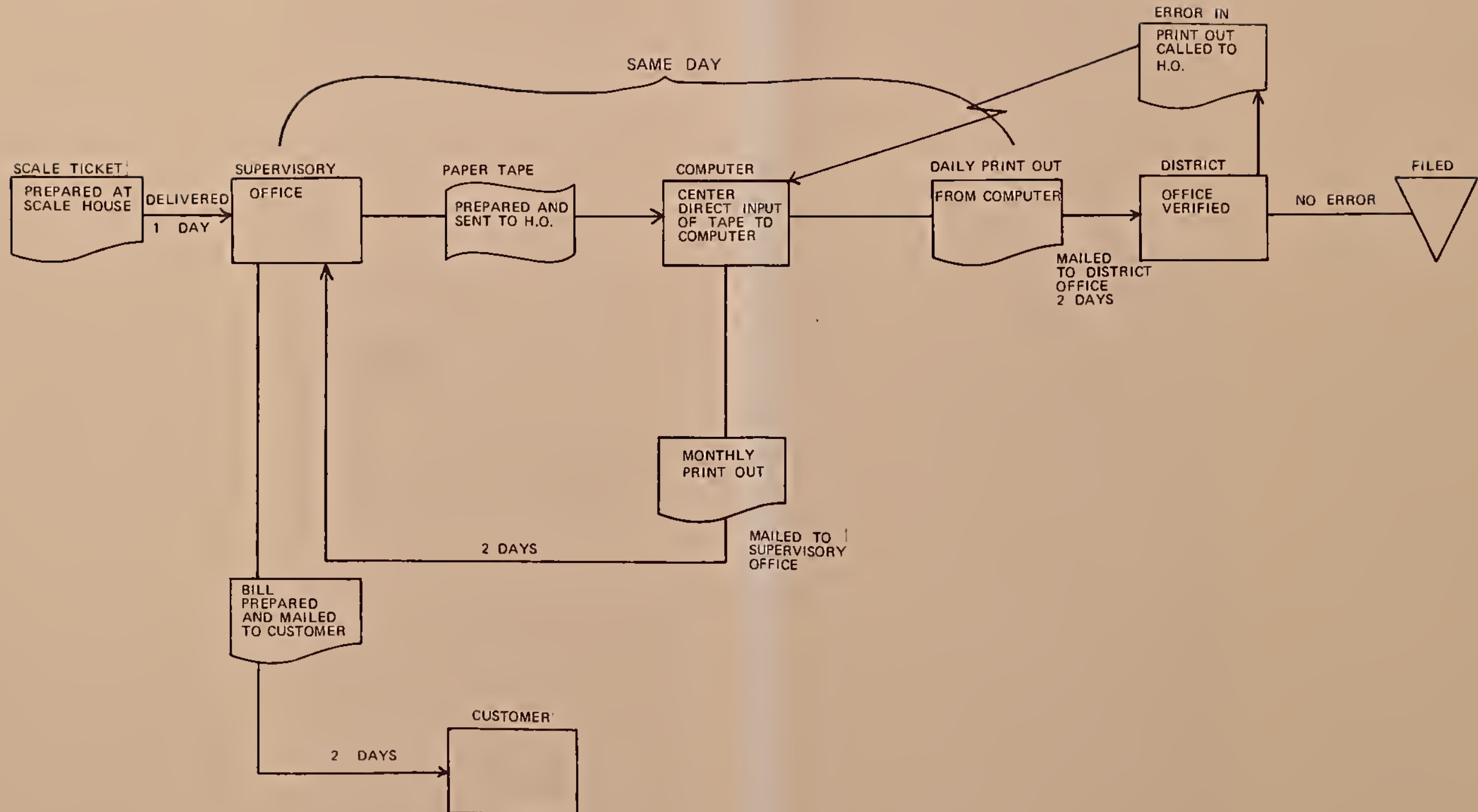


# SCALE TICKETS OLD



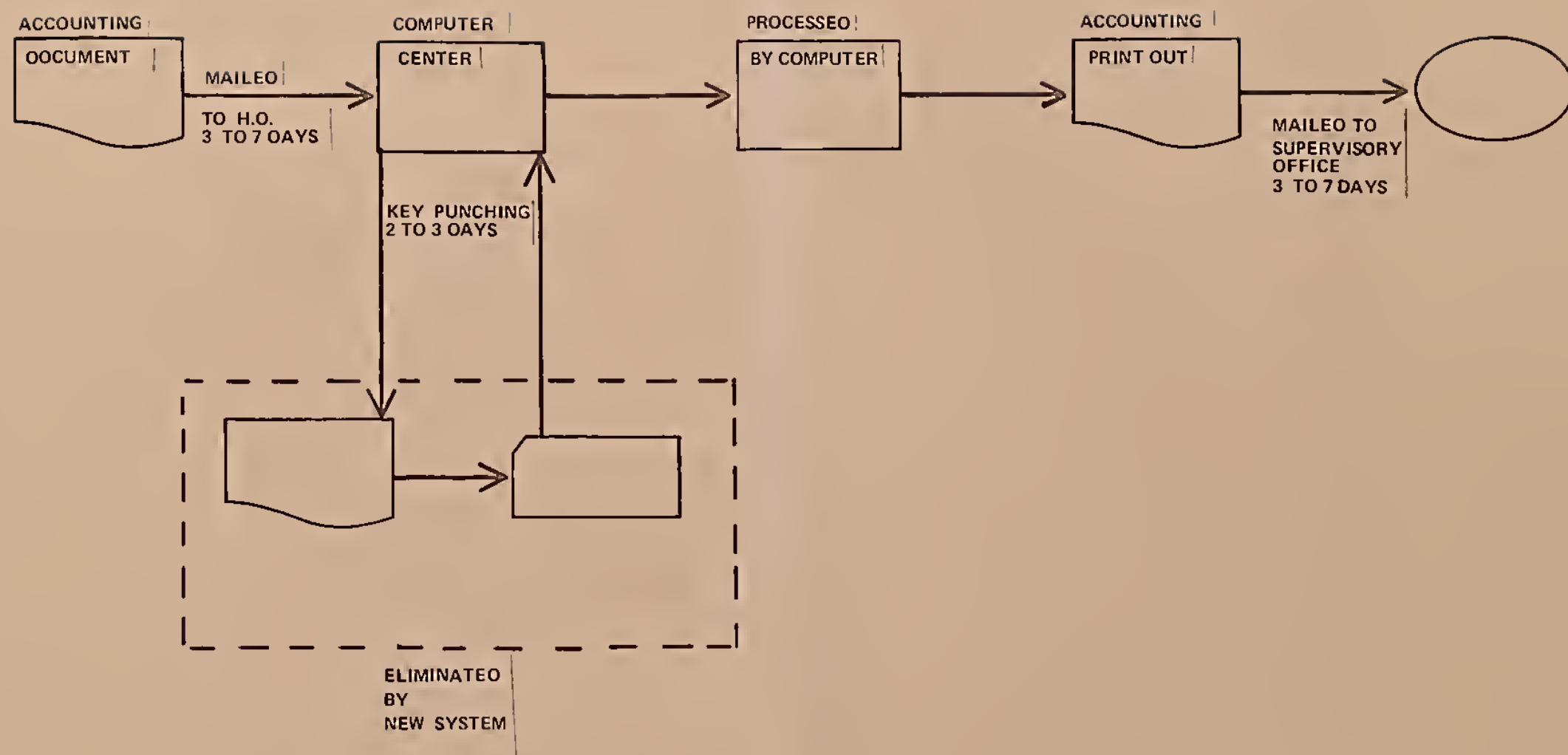


# SCALE TICKETS NEW



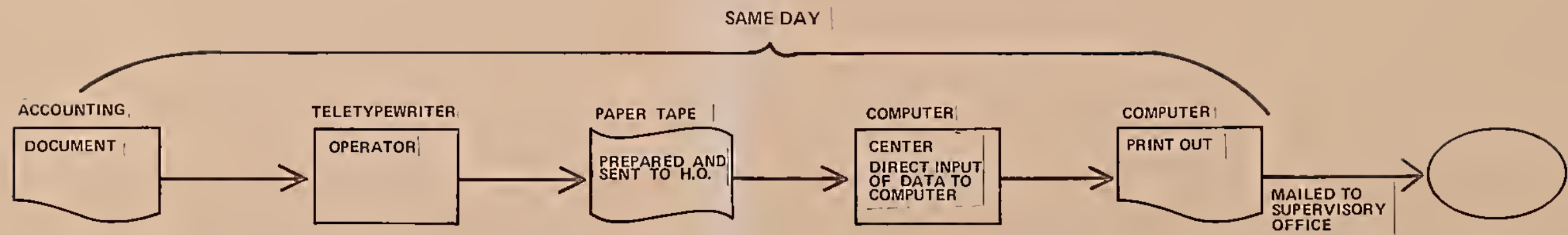


# ACCOUNTING OLD





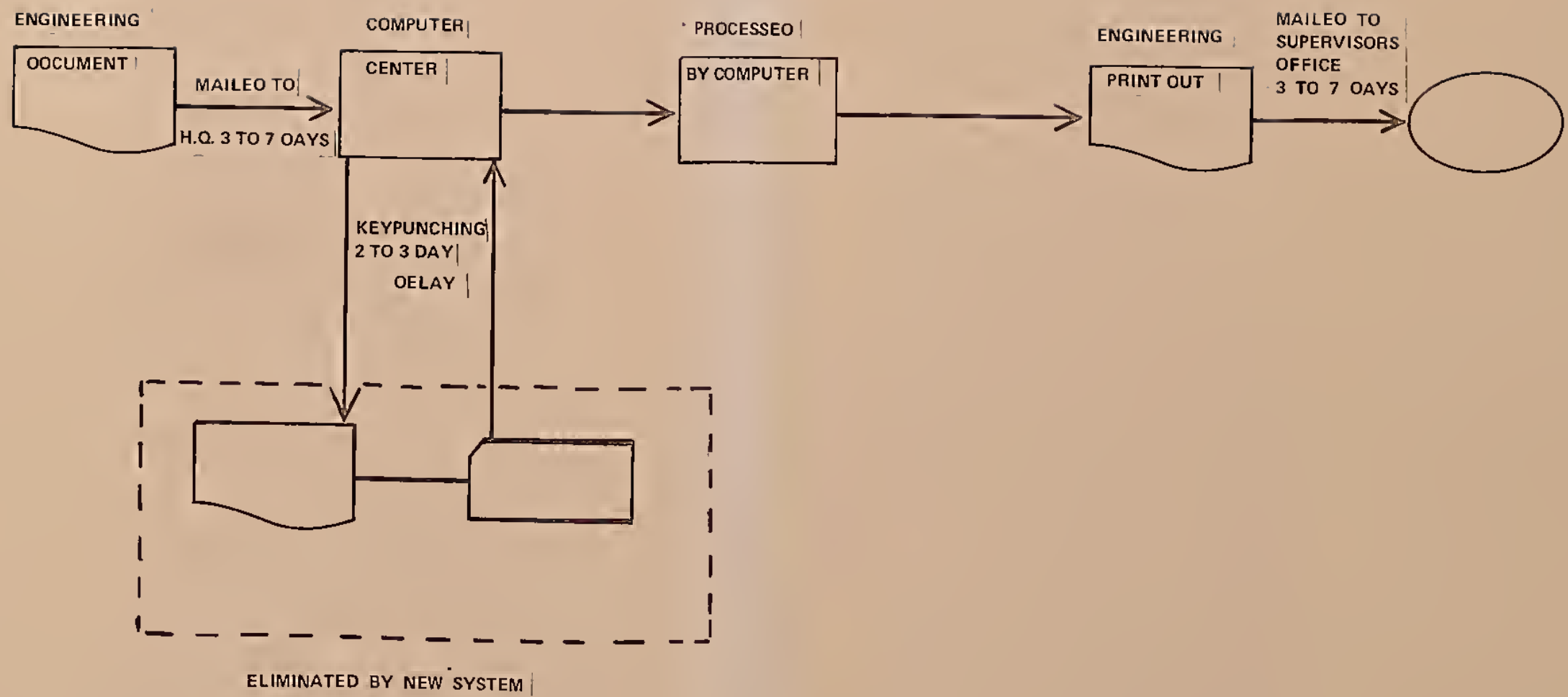
## ACCOUNTING NEW





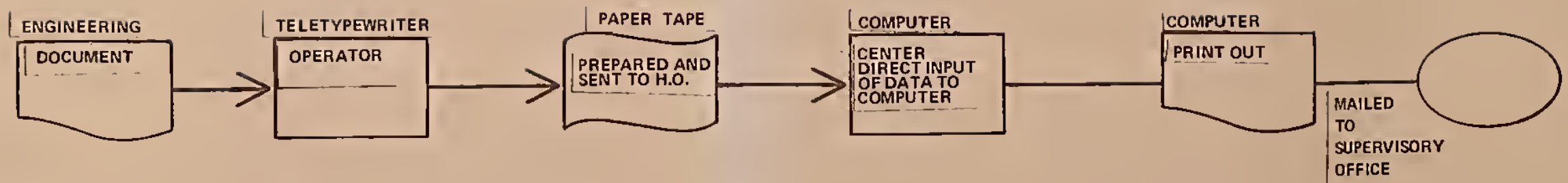


## ENGINEERING OLD





## ENGINEERING NEW









## MAINTENANCE REQUIREMENTS

THE 400 DATA PACKAGES AND TELETYPEWRITER STATION EQUIPMENT WILL BE MAINTAINED ON A TWO-HOUR RESPONSE TO TROUBLE REPORTS DURING NORMAL CONDITIONS AND FOUR HOURS UNDER ADVERSE CONDITIONS. EQUIPMENT ROUTINE SCHEDULES WILL BE ESTABLISHED DEPENDING UPON USAGE.

- (1) TROUBLES ON CALLS WITHIN A 400 DATA PACKAGE WILL BE REPORTED TO LOCAL TELEPHONE COMPANY MAINTENANCE FORCE IN ACCORDANCE WITH THE INSTRUCTIONS POSTED ON THE TELETYPEWRITER EQUIPMENT. TROUBLES FALLING INTO THIS CATEGORY WOULD BE OBVIOUS STATION EQUIPMENT TROUBLES OR DIFFICULTIES IN REACHING OTHER STATIONS SERVED BY THE SAME 400 DATA PACKAGE.
- (2) TROUBLES ON THE BROADCAST NETWORK WILL BE REPORTED TO LOCAL TELEPHONE COMPANY MAINTENANCE FORCE IN ACCORDANCE WITH THE INSTRUCTIONS POSTED ON THE TELETYPEWRITER EQUIPMENT.





## TRAINING

THE PACIFIC TELEPHONE COMPANY WILL PROVIDE TRAINING AT EACH OF YOUR LOCATIONS. HIGHLY SKILLED TRAINING PERSONNEL WILL VISIT YOUR OFFICES APPROXIMATELY TWO WEEKS PREVIOUS TO START OF SYSTEM TO PROVIDE TRAINING ON THE 35 ASR EQUIPMENT. RETRAINING WILL BE DONE WHENEVER REQUESTED.

WE FEEL A MINIMUM OF THREE PEOPLE SHOULD BE TRAINED AT EACH LOCATION TO COVER VACATIONS, ILLNESS, ETC.

THE 35 ASR IS NOT DIFFICULT TO OPERATE, THE KEYBOARD IS VERY SIMILAR TO A STANDARD TYPEWRITER KEYBOARD, THEREFORE, ANY TYPIST COULD BE TRAINED TO OPERATE THE EQUIPMENT.

12-29-69





**TELETYPE MODEL 35 EQUIPMENT**  
*for reliable, versatile 8-level data communications*



TELETYPE



the importance of  
DATA COMMUNICATIONS  
equipment!



# the many benefits of TELETYPE MODEL 35 equipment

## **MODULAR DESIGN**

The modern, modular design of Teletype Model 35 heavy-duty equipment assures not only its compatibility with the latest business office decor, but also with most data processing systems. For instance, it uses the U.S.A. Standard Code for Information Interchange. ASCII is the language used by computers and other business machines.

Model 35 machines print on standard roll paper as well as nearly any single or multiple-copy business form. Streamlined cabinets equipped with rubber vibration

isolators reduce operating sounds to a minimum.

## **EASY OPERATION**

The 4-row keyboard of Model 35 sets is similar to that of an office typewriter, making it easy for all your typists to use. In addition, the keyboard has clearly marked controls and is electrically powered to provide a light, uniform touch for the operator. Printing is always sharp and clear with up to eight carbon copies easily produced.

## **SPEED AND ECONOMY**

Teletype Model 35 equipment operates at 10 characters per sec-

ond (100 words per minute) or less when required. Even at this speed, maintenance is kept to a minimum with lubrication required only once every six months or after 1500 operating hours, whichever occurs first. Servicing time itself is reduced with easy accessibility to the set's internal parts.

There are many features of Teletype Model 35 equipment that make it an important asset in fulfilling your data communication needs. Many of these, as well as several practical applications within data handling systems, are described on the following pages.







# The many business applications of TELETYPE MODEL 35 equipment



The versatility and reliability of Teletype Model 35 sets are among the reasons why they are so proficient in collecting, integrating, forwarding, and disseminating data of all kind. Their data communications capabilities encompass inventory control, production control, order processing, administrative data processing, and telemetry as well as many others. Teletype Model 35 machines are found in use in nearly every business and industry in addition to the government and military as the following examples show.

## IMPROVES DECISION-MAKING

A major producer of heating units uses Teletype Model 35 ASR (automatic send-receive) sets to link distributing facilities in New Jersey and Ohio directly with its home office computer center. This company not only has cut as much as four days off its order processing cycle, but also regularly supplies its management with up-to-date reports on company activities.

According to the company's marketing vice president, "this (system) enables better decision-making capabilities, permitting greater flexibility in dealing with customer demands."

## SOLVES PROBLEMS IN MINUTES



Teletype Model 35 ASR machines are used by a major automobile manufacturer to put engineers in

touch with a real-time computer on a time-sharing basis. This not only simplifies the solution of complex engineering problems, but enables engineers to gain immediate access to information stored in the computer's 2-million word memory.

This has helped cut from weeks to minutes the time required to solve many difficult problems. Also, since Teletype sets are relatively inexpensive and the computer is preprogramed, each engineer is able to use the real-time computer to speed up solutions to a great variety of his problems.

## REDUCES MANUFACTURING COSTS



Unlike the mass-production lines of most manufacturing plants, an aircraft factory is more like a number of job shops. Raw material needs, inventory levels, and work schedules may vary between shifts making it difficult to keep control over production operations. Data processing has helped to improve the flow of data, but a lag still exists between the time factory conditions are reported to and acted upon by management.

One large aircraft producer solved the problem by tying into two real-time computers with Teletype Model 35 KSR (keyboard send-receive) sets in various plant locations. Thus, production data is instantly fed to the computer center. This not only enables plant supervisors to query the computers for job orders, production schedules or other operating information, but provides top management with

the latest production and inventory data in order to make more accurate, timely decisions. The system has improved management's control over plant functions, shortened production time, and reduced overall manufacturing costs.

## IMPROVES DATA FLOW



A sophisticated real-time data processing system of a large household appliance manufacturer absorbed data so quickly that the benefits derived from the computer's speed were lost because data was not being received fast enough. By installing Teletype Model 35 ASR sets at the firm's 18 district office-warehouses around the nation, the manufacturer assured the direct transmission of data to the computer center instantaneously.

The bulk of this data relates to some 2,000 different appliance models that are shipped from the warehouses to the firm's customers. After receiving this information, the computer prepares invoices and accounts receivable ledgers, reduces warehouse inventories, makes journal entries, and produces a variety of sales reports and analyses.

The district offices continually update the overall sales forecasts by using the Model 35 machines to transmit this data to the computer center. This results in fast production schedule changes to meet requirements and substantially reduce finished goods inventories. In addition, Teletype sets are used to transmit payroll information from the firm's Milwaukee plant to the computer center in Chicago, where the computer calculates the pay and writes the checks.

## TELETYPE MODEL 35 ASR SETS automate your data communications

The Teletype Model 35 ASR (automatic send-receive) set provides further versatile data communications through the automatic operation of punched paper tape. Besides a page printer, the ASR set consists of both a paper tape punch and tape reader.

Paper tape provides many advantages for data users. It is easy to handle, accommodates data of any length, and is inexpensive and reliable.

### COMBINES DATA

The paper tape punch and tape reader can be used to combine taped data from various sources into one error-free master tape. Then the tape reader can automatically send the data at maximum speed to other Teletype machines or computers.

The Model 35 ASR set is capable of sending data from the tape reader, while receiving information on the page printer. At the same time, the keyboard can be used to punch a completely independent tape.

### USES ASCII

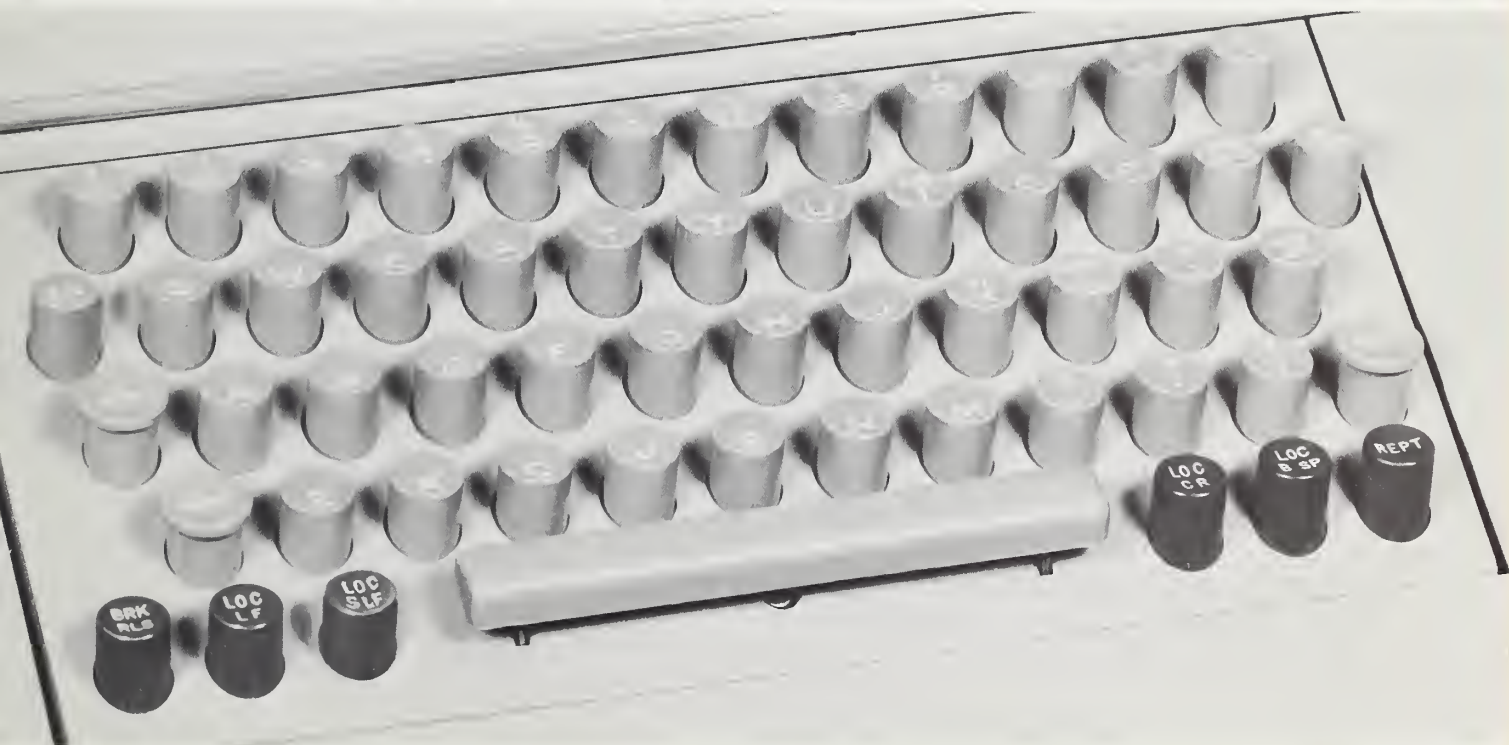
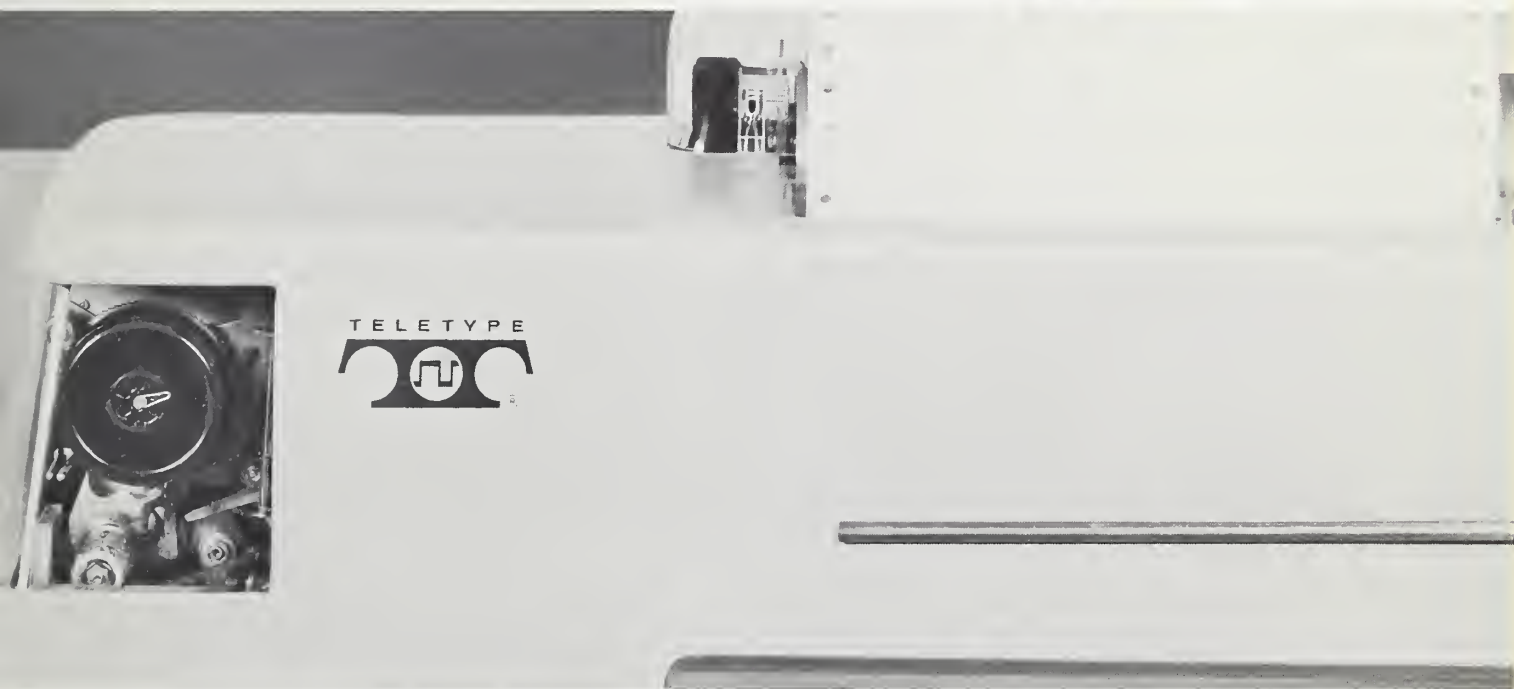
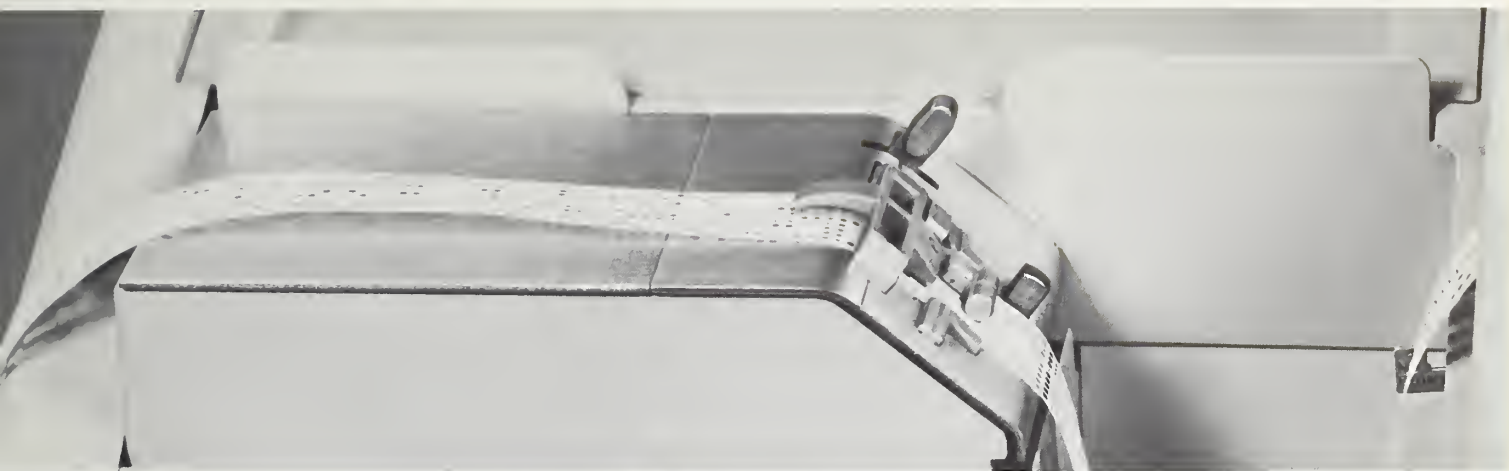
Model 35 equipment uses the U.S.A. Standard Code for Information Interchange (ASCII). ASCII is the code used by many computers and business machines. A parity bit is automatically added to provide "even" vertical parity across the eight levels of each code combination—for error control.

**Paper Tape Reader** Operates in conjunction with or independently of the other components of the Model 35 ASR set. It senses the data stored in 8-level, 1-inch wide tape and generates corresponding serial signals to send the data. The reader features a hinged tape lid for easy threading, as well as tape-out and taut-tape switches to automatically stop transmission when the tape ends or becomes snagged.

**Paper Tape Punch** Receives information in the form of serial signals from the set's own reader or keyboard, or from remote equipment. It fully perforates an 8-level, 1-inch wide tape with or without printing. Waste chad from the punch falls into an easily emptied bin. Completed tapes are removed with an adjustable metal tearing edge.

**4-Row Keyboard** Any typist can easily learn to use the 4-row keyboard of the Model 35 ASR and KSR sets since it is similar to that of a regular office typewriter. In addition, there is no need to shift between letters and numbers, which helps reduce the chances of errors.







TELETYPE MODEL 35  
PAGE PRINTERS



Teletype Model 35 KSR (Keyboard Send-Receive) Set



Teletype Model 35 Wall-Mounted RO (Receive-Only) Set



A UNIT FOR EVERY OFFICE

Besides the floor consoles, Teletype Model 35 page printers are available in both table model and wall-mounted sets. The table model fits easily on any standard desk top and can be used for both mobile and stationary applications.

The wall-mounted page printer is only 16 1/2 in. wide and does not require any floor space. Where space is at a premium, these units assure you of all the basic communication advantages of the console page printers but in far less space.

OPTIONAL FEATURES

Versatility has been the key word in describing Teletype Model 35 equipment. Yet, there are many optional features available that provide even more versatility to simplify and improve your data communications. Model 35 sets can be furnished with horizontal and vertical tabulators, different styles and sizes of type, a variety of platen widths, automatic carriage return-line feed, and many others including features that add to the automatic operation of Model 35 equipment. A few of these are listed below.

**Automatic Answer-Back** An answer-back drum on Model 35 equipment is triggered by a remote Teletype machine so the local unattended station automatically returns its identification call letters (up to 20 characters) to the sending station.

**Automatic Reader Control** Allows taped data to be transmitted automatically by the reader of an unattended Model 35 ASR set when called in by a remote Teletype machine.

**Automatic Punch Control** Allows data to be transmitted to the reperforator of an unattended set when called in by a remote Teletype machine.

**Automatic Printer Control** Allows printed data to be transmitted to the printer of an unattended set when called in by a remote Teletype machine. When these last three features are used on the same set, you can separate the tape punch, tape reader, and printer operations, enabling you to tape data without printing page copy or print copy without punching a duplicate tape.

**Automatic Form Feed-Out** One key stroke enables you to advance a business form, bringing the next one to the starting position automatically.

FOR INFORMATION ABOUT:

TELETYPE SERVICES including Teletype Model 35 equipment, consult your local telegraph and/or teletype company. Please call SINC (or write for information) about the use of any Teletype equipment, contact our Sales Organization at the General Office address listed on the back cover. We are interested in input/output terminals for your DATA PROCESSING SYSTEM. Here is a special Teletype equipment for your vital communications link.

TECHNICAL INFORMATION

|       |          |          |          |          |
|-------|----------|----------|----------|----------|
| SPEED | Model 35 | Model 35 | Model 35 | Model 35 |
|       | 10       | 15       | 20       | 25       |
|       | 30       | 40       | 50       | 60       |
|       | 70       | 80       | 90       | 100      |

|      |                      |
|------|----------------------|
| CODE | 8 level 11 bit ASCII |
|------|----------------------|

|      |                     |
|------|---------------------|
| TAPE | 8 level 11 bit wide |
|------|---------------------|

|         |     |     |     |     |
|---------|-----|-----|-----|-----|
| PRINTER | 10  | 15  | 20  | 25  |
|         | 30  | 40  | 50  | 60  |
|         | 70  | 80  | 90  | 100 |
|         | 110 | 120 | 130 | 140 |

|          |    |    |    |    |
|----------|----|----|----|----|
| KEYBOARD | 10 | 15 | 20 | 25 |
|----------|----|----|----|----|

|                    |    |    |    |    |
|--------------------|----|----|----|----|
| POWER REQUIREMENTS | 10 | 15 | 20 | 25 |
|                    | 30 | 40 | 50 | 60 |

|                      |    |    |    |    |
|----------------------|----|----|----|----|
| MAINTENANCE INTERVAL | 10 | 15 | 20 | 25 |
|----------------------|----|----|----|----|

| DIMENSIONS AND WEIGHT |        |        |        |                |
|-----------------------|--------|--------|--------|----------------|
| Model                 | H. h   | Width  | Depth  | Approx. Weight |
| 1                     | 12 in. | 10 in. | 10 in. | 6 lb.          |
| NSR                   | 18 in. | 20 in. | 24 in. | 16 lb.         |
| A R                   | 30 in. | 40 in. | 34 in. | 26 lb.         |



TELETYPE



*machines that make data move*

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SECTION I  
GENERAL DESCRIPTION

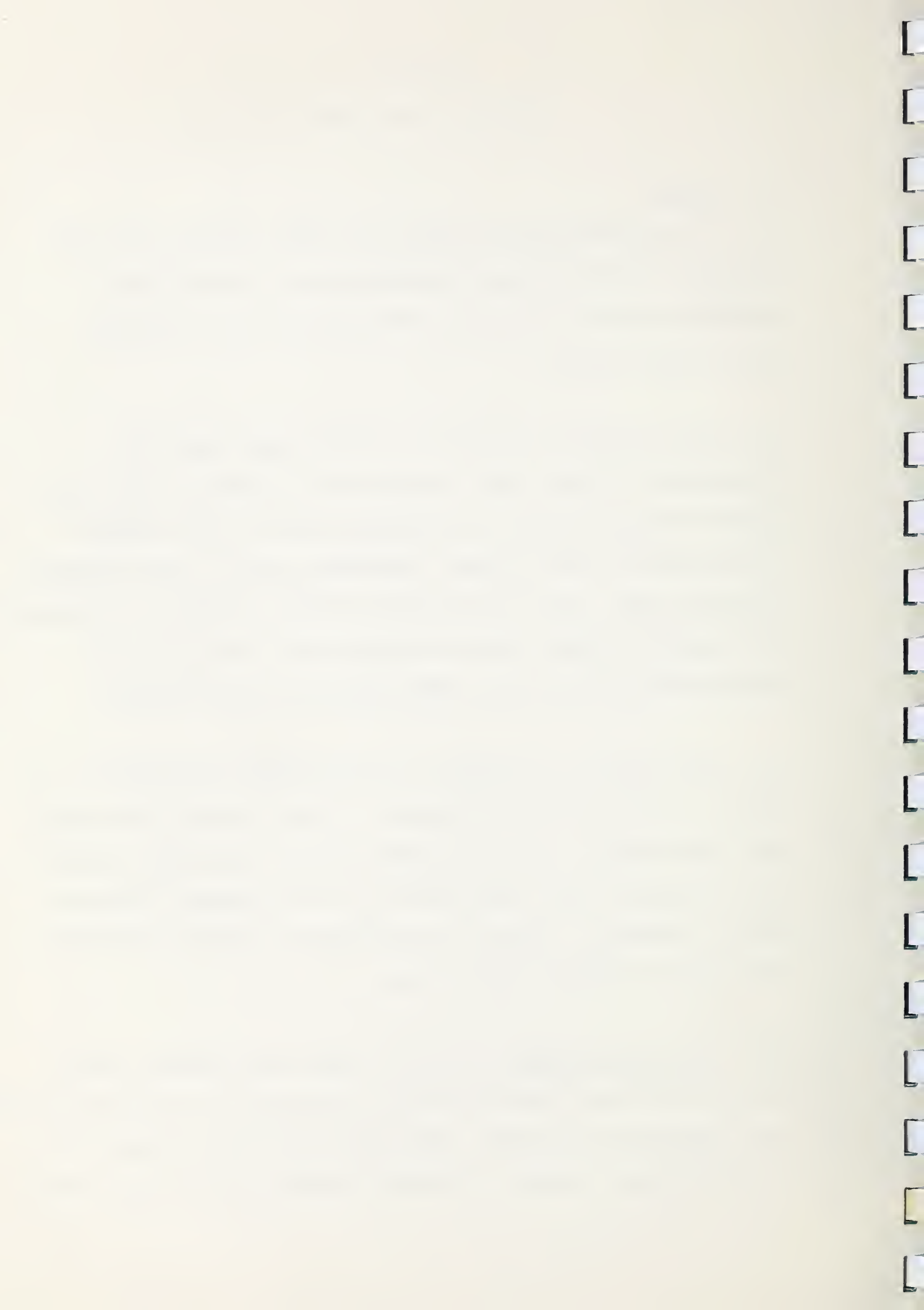
1. GENERAL

1.01 THIS MEMORANDUM OUTLINES THE SYSTEM CONCEPT AND GIVES SPECIFIC SWITCHING DESIGN INFORMATION AND DESCRIPTION OF OPERATION FOR THE 400 DATA PACKAGE WHICH IS AN INTERGRAL PART OF THE NETWORK.

1.02 THE 400 DATA PACKAGE IS A PRIVATE LINE SWITCHING ARRANGEMENT FOR DATA THAT PROVIDES LINE SWITCHED, VOICE BAND COMMUNICATIONS BETWEEN ALL STATIONS SERVED BY THE NETWORK. IT CONSISTS OF DATA PACKAGES (SWITCHING UNITS) INTERCONNECTED BY TRUNK LINES. EACH DATA PACKAGE SERVES A NUMBER OF COMMUNITY OF INTEREST STATIONS AND EACH STATION HAS THE ABILITY TO INTERCOMMUNICATE WITH ALL OTHER STATIONS IN THE NETWORK.

1.03 THE NETWORK IS DESIGNED TO INTERCONNECT STANDARD NO. 33 AND NO. 35 TWX-TYPE DATA STATIONS. OTHER STATIONS, FOR OTHER TYPE DATA TRAFFIC, USING AVAILABLE STATION EQUIPMENT, EITHER LOOP OR GROUND START ORIGINATING, MAY BE CONNECTED PROVIDED PROPER INTERFACE, SIGNALING ARRANGEMENTS, FACILITY TREATMENT AND CLASS OF SERVICE ARE APPLIED.

1.04 400 DATA PACKAGES: EACH OF THESE DATA PACKAGES SERVE AS LOCAL SWITCHING UNITS TO PROVIDE INTRA-OFFICE CONNECTIONS FOR THEIR RESPECTIVE STATIONS. THE 400 DATA PACKAGE SERVES UP TO 60 TERMINATIONS (PORTS) OF EITHER STATION LINES OR TRUNK LINES.



## 2. FEATURES

### 2.10 THE FEATURES AND OPTIONS OF THE NETWORK ARE:

- (1) A FAMILY OF DATA PACKAGES IN TERMINATION INCREMENTS TO SERVE A VARIETY OF COMMUNITY OF INTEREST GROUPS.
- (2) DATA PACKAGES MAY BE LOCATED ON CUSTOMER PREMISES.
- (3) VOICE BAND COMMUNICATIONS CAPABILITY WITH 4 WIRE SWITCHING.
- (4) TOUCH-TONE DIALING EITHER MANUAL, CARD OR AUTOMATIC.
- (5) CALLED STATION ACKNOWLEDGEMENT AND CONTINUOUS CIRCUIT ASSURANCE.
- (6) SINGLE PILOT NUMBER DELIVERY FOR MULTIPLE STATION LOCATIONS.
- (7) AUTOMATIC ANSWERING AT TERMINATING STATIONS.
- (8) WRITTEN CONFIRMATION OF CALLED STATION ANSWER-BACK BETWEEN 33 AND 35 TYPE TELETYPEWRITER DATA STATIONS.
- (9) AUTOMATIC RETRY ON CALLED STATION BUSY.
- (10) AUTOMATIC MAKE-BUSY AND TERMINAL HUNTING ON STATION OUT-OF-SERVICE.
- (11) CONSISTENT OPERATION THROUGHOUT THE VARIOUS DATA PACKAGES.



(12) CALL CONDITION TONES.

A - DIAL TONE

B - RETRY TONE

C - UNASSIGNED NUMBER TONE

D - BUSY TONE

(13) MULTIPLE ADDRESS CAPABILITY.

(14) AUTOMATIC CONTINUOUS TAPE ORIGINATING AND  
DIALING STATION FOR SPECIAL LOCATIONS.

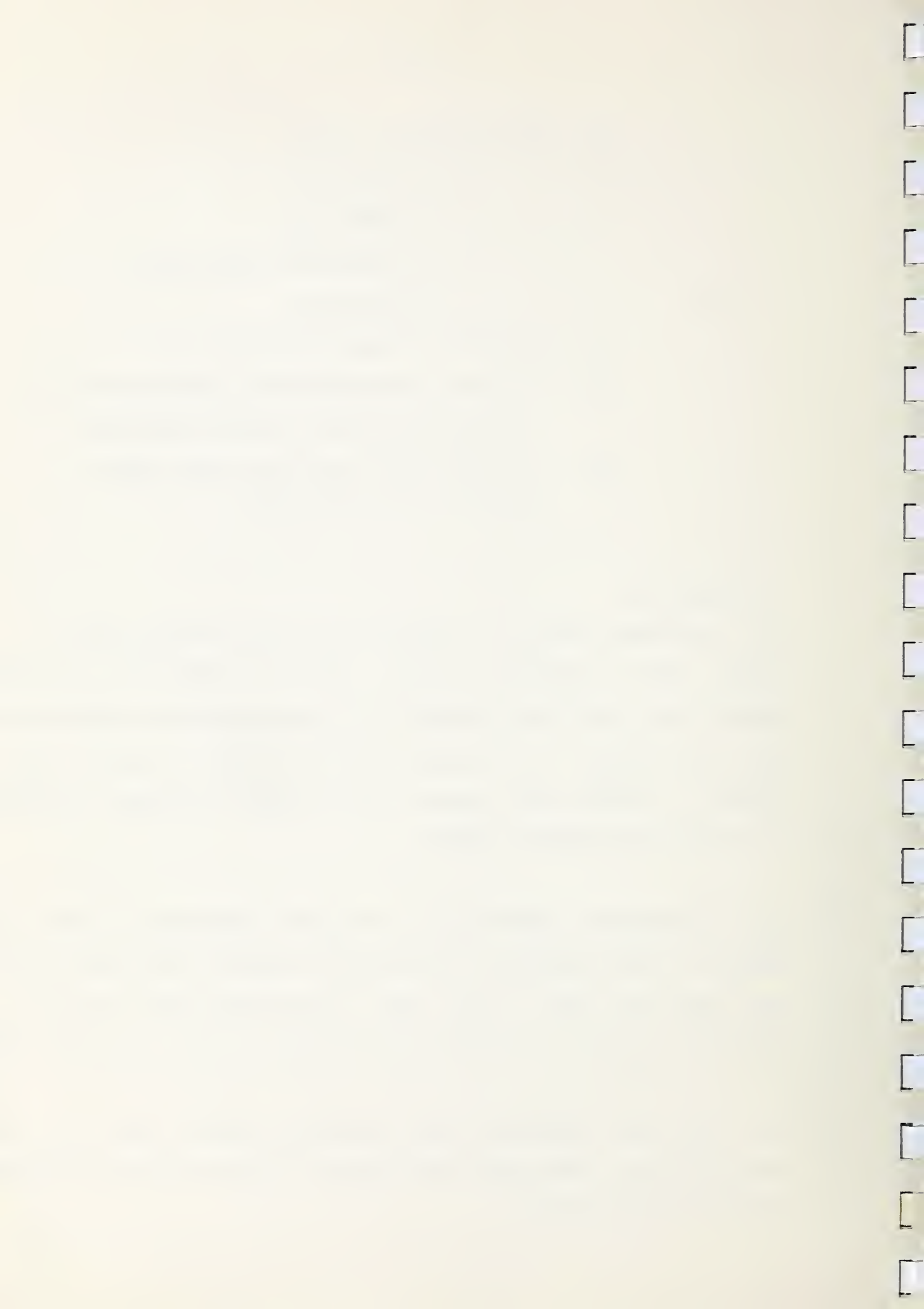
(15) AUTOMATIC ALL-POINTS-BULLETIN, OFTEN  
REFERRED TO AS BROADCAST.

### 3. OPERATION

3.10 TOUCHTONE DIALING IS REQUIRED AND MAY BE FROM EITHER A MANUAL, CARD OR AUTOMATIC DIALER. STATIONS SERVED BY A 400 DATA PACKAGE DIAL A TWO DIGIT NUMBER FOR CALLING STATIONS SERVED BY THE SAME DATA PACKAGE. FOR CALLING STATIONS SERVED BY ANOTHER DATA PACKAGE, A SINGLE DIGIT NETWORK ACCESS NUMBER IS DIALED FOLLOWED BY A TWO DIGIT STATION NUMBER.

3.02 FUNDAMENTAL OPERATION IS CONSISTENT THROUGHOUT IN THAT, ANY STATION ON THE NETWORK MAY BE CALLED BY DIALING A TWO DIGIT NUMBER. CALL CONDITION TONES: DIAL, RETRY, UNASSIGNED NUMBER AND BUSY ARE THE SAME IRRESPECTIVE OF THE DATA PACKAGE THE CALL IS ROUTED THROUGH.

3.03 ALL CALLS ANSWERED, EXCEPT MULTIPLE ADDRESS CALLS, ARE DIRECT POINT-TO-POINT CONNECTIONS AND PROVIDE A VOICE BAND PATH CAPABLE OF ON-LINE COMMUNICATIONS.







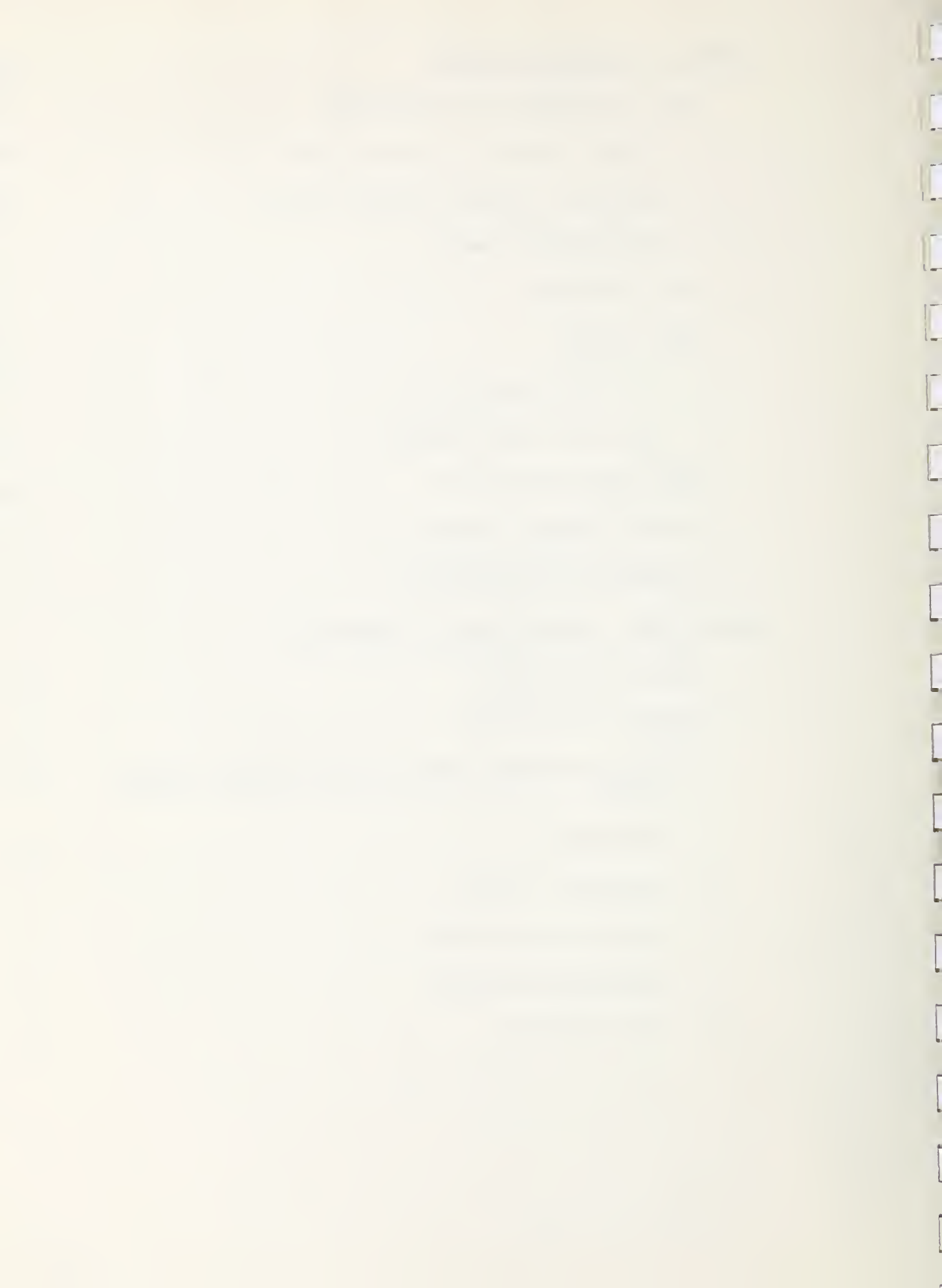


Private Service Systems -  
No. 400 Data Package

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## SECTION I - GENERAL DESCRIPTION

### 1. GENERAL

1.01 This memorandum gives the specific requirements and describes the operation of a private line switching arrangement for data communications.

1.02 The 400 Data Package is a common control, optional 2-wire or 4-wire, crossbar switching arrangement incorporating the following features:

- (1) Marker control
- (2) 10 links (simultaneous switching paths)
- (3) Modular line, link and marker arrangement ranging from a minimum 10 to a maximum 60 terminations (lines or trunks) in increments of 10 terminations each
- (4) Rectangular design whereby all terminations have direct access to all other terminations via the vertical-horizontal link switching paths
- (5) Housed in one 3-slide cabinet up to and including 20 terminations. Two cabinets required above 20 terminations
- (6) Automatic retry on called station busy condition.
- (7) Retry time-out to prevent excessive trunk or line holding
- (8) Automatic attempt to release calling station (disconnect) following retry time-out
- (9) Loop or ground start supervision
- (10) Dial pulse, or touch tone, signaling from station
- (11) Traffic usage and peg count registers
- (12) Five classes of service. One class-of-service is required for Multiple Address restriction.
- (13) Incorporated DC power supply



(14) Call Condition Tones:

- (a) Dial tone
- (b) Busy tone
- (c) Retry tone
- (d) Unassigned number tone

(15) Two-digit station selection

(16) Single-digit access for interoffice calls, where applicable

(17) Optional multiple address

1.03 The arrangement is designed to interconnect standard No. 33 and No. 35 TWX-type data stations. No modification of the station is required. However, the appropriate station option should be applied to provide a loop indication when the Out-of-Service key is operated and provide a Ring-No-Answer condition on:

- (1) Paper out - If used
- (2) Low paper - If used
- (3) Paper jam - If used

1.04 Other stations, for other type data or dataphone traffic, using available station equipment, Data or Dataphone sets, either loop or ground start originating, may be connected provided proper interface, signaling arrangements, facility treatment and class of service are applied.

## 2. APPLICATION

2.01 The 400 Data Package is a self-supporting switching entity. It does not require interconnecting trunks to other offices or systems. However, interconnection via tie trunks, or access lines, may be made to any other network with which it is operationally compatible provided such interconnection is in accordance with policy and tariff rulings.





2.02 It is not intended that the switching unit be used as an intermediate or tandem office. That is, trunk-to-trunk switching is not applicable where outpulsing (signaling forward) is required. However, where more than one dial tone is operationally practicable, it may be used as an intermediate switching office with appropriate numbering plan arrangements.

2.03 Where a preponderance of 4-wire circuits are to be switched, a 4-wire Data Package will be more economical. A 2-wire Data Package may better serve for other arrangements. Where any 4-wire station is to be served for full duplex operation, a 4-wire Data Package must be used.

## SECTION II - DESIGN REQUIREMENTS

### 1. GENERAL

1.01 In addition to meeting all the specific requirements of this section, the circuit and equipment arrangement of the 400 Data Package shall be such as to provide all of the features and perform all of the functions described in SECTION III - DESCRIPTION OF OPERATION.

### 2. EQUIPMENT ARRANGEMENT

2.01 All of the equipment for switching, including line and trunk terminations and standard power, with the exception of excessive trunk applique units when used as a 2-wire switch, shall be housed in 3-slide cabinets. Up to and including 20 terminations it shall be contained in one such cabinet. Up to and including 60 terminations it shall be contained in two such cabinets.

2.02 Excess space available in the first cabinet of the 2-wire switch may be allocated for "Trunk Applique Units" for 4-wire terminations. If the switching unit location and the transmission design dictate that "Applique Units" are required in excess of the available space they may be located in an external floor or wall mounted apparatus cabinet or on available equipment room frames.

2.03 Multiple address equipment shall be located in the first (20 line) cabinet of the 4-wire switch. When used with a two wire switch it may be located in external floor or wall mounted cabinets or on available equipment room frames.



- 2.04 External alarm indicators are not required. If they are deemed necessary for a particular installation they shall be specified and arranged for by local engineering.
- 2.05 Attendant control arrangements and tape or hard copy intercept equipments are not required.
- 2.06 A terminal strip, connecting block or connector interface shall be provided for connecting all external circuits, controls or optional equipment cables including DX and 20 cycle signaling leads and 48 volt power leads, but not commercial AC power.
- 2.07 An appropriate gauge cord, not to exceed 15 feet in length, and of three conductor type shall be provided for connection to commercial AC power. Special arrangements for power and telephone cable entrance shall be left to local engineering.

### 3. CIRCUIT ARRANGEMENTS

#### GENERAL

- 3.01 The 400 Data Package shall be capable of terminating the specified number of lines and trunks. It shall upon receipt of appropriate signaling commands be able to interconnect any one such termination to any other such termination and establish a voice band communications path between the two terminations, unless limited by class of service restriction or abnormal circuit conditions.
- 3.02 It shall provide appropriate response to and generation of signals to its connecting lines and trunks and shall automatically respond to abnormal conditions in the manner specified. Sketch 1, attached, is a simplified block diagram of the major switching components with a brief sequence of operation.
- 3.03 Provide:
- (1) Common control (single marker), optional 2-wire or 4-wire switching
  - (2) Two registers - Combined Dial pulse and touch tone



- (3) Five classes of service
- (4) Two retry registers
- (5) A basic ten termination package
- (6) Modules capable of increasing the size of the package in increments of ten termination each, up to a maximum 60 terminations
- (7) Standard DC pulse dialing and touch tone dialing recognition
- (8) Optional multiple address
- (9) Call Condition Tones:
  - (a) Ringing - Standard instant and continuous with optional conventional ringing
  - (b) Dial tone - 640 cps
  - (c) Busy tone - 60 ipm dial tone
  - (d) Unassigned number tone - 120 ipm dial tone
  - (e) Retry tone - 15 ipm dial tone
- (10) Two-digit station selection for intra-office calls, single-digit access code for interoffice (trunk) calls, either loop or ground start from station.
- (11) Traffic usage and peg count registration leads
- (12) Major alarm lead to demarcation connecting block
- (13) Permanent signal condition time-out
- (14) Automatic retry and retry time-out
- (15) For terminal hunting group station terminations with random call allotting
- (16) Random trunk call allotting
- (17) Universal line circuit (for use with 4-wire switching units)



- (18) Trunk applique circuit (for use with 2-wire switching unit line circuits)
- (19) Automatic attempt to disconnect calling station on retry time-out

#### DIAL SIGNAL REGISTRATION

3.04 After dial tone or other appropriate register attachment indication is applied to a station line, the registration circuitry must be able to recognize and act upon either DC pulse or, touch tone signals from that line. Both types of signals are to be recognizable in a given data package as station line signals.

3.05 Signal registration for incoming calls on trunks interconnected with the No. 2A Data Network shall be arranged for DC pulse.

#### CALL CONDITION TONES

##### A. Ringing

3.06 Standard 20 cycle generator supply shall be provided in both the 2-wire and 4-wire packages. In the 2-wire Data Package a readily changeable option shall be provided to supply either continuous, or conventional interrupted, 20 cycle to a local 2-wire station line as a ringing signal. In all cases, in both the 2-wire and 4-wire packages, continuous and optional interrupted, 20 cycle generator shall be made available at the interface of the first 20-line cabinet, for external use. An audible indication of called station ringing or signaling shall be returned to the calling line. The return signal may be conventional interrupted.

##### B. Dial Tone

3.07 Provide 640 cycle for dial tone.

##### C. Busy Tone

3.08 Busy tone shall be 60 ipm of dial tone and shall be applicable under the following conditions:

- (1) All retry trunks busy







- (2) As a permanent signal (PS) indication toward the Off-Hook station if dialing does not occur after an interval of 8-16 seconds of dial tone.
- (3) Following retry time-out if the calling station does not respond to the automatic disconnect signals.

#### D. Retry Tone

3.09 Retry tone shall be 15 ipm of dial tone. The first "burst" of retry tone shall occur within 0-3 seconds after a call has attained retry condition.

#### E. Unassigned Number Tone

3.10 The unassigned number tone shall be 120 ipm of dial tone and shall be returned to the calling line for an interval of at least 8-16 seconds or until the calling station "hangs up". It shall be applied for all incomplete, invalid, non-working and unassigned numbers except unassigned 0 - codes which, if dialed, will appear as busy terminations.

#### TRAFFIC REGISTRATION

3.11 The following information leads shall be available at the demarcation connecting block for cross connection to traffic registration equipment:

- (1) Peg count or usage lead per station line - for completed originating calls only
- (2) Register peg count
- (3) Retry register peg count
- (4) Retry time-out peg count

#### MAJOR ALARM

3.12 Dry circuit closures shall be made available at the cabinet terminal strips or connectors for external use to indicate:

- (1) The operation of any DC power fuse
- (2) DC power source failure, irrespective of fuse operation



## AUTOMATIC RETRY

- 3.13 When a calling station encounters a called number busy condition the call shall advance to retry. If a retry register is available, the circuitry shall process the call with repeated attempts to connect to the called number. The retry attempts shall occur at intervals of 6-10 seconds and shall continue for an overall interval, initially, of 55-65 seconds as long as the calling station remains "off-hook." The overall timing interval shall be adjustable over the range of 30 to 100 seconds in maximum increments of 30 seconds.
- 3.14 If, on a repeated attempt, the called station is seized, a normal connection shall be established between the calling and called lines.
- 3.15 If the called station is not reached at the expiration of the (average 60 second) timing interval an attempt to disconnect and release the calling station shall be made by applying appropriate data tones for 100 type data terminal equipment. If the attempt to disconnect is successful, the connections shall be released and all circuits returned to the normal idle condition. If the calling station does NOT disconnect, the switching circuits shall be released and busy tone shall be returned to the calling line and shall be sustained until the calling station hangs up or the line is cleared.
- 3.16 Should there be no retry registers available when the call is advanced to retry, the originating register shall be released and a busy tone returned to the calling line and sustained until the calling station hangs up.

## LINE AND TRUNK BUSY CONDITIONS

### A. Single Terminal Station Lines

- 3.17 The line terminal shall appear busy on any condition that bridges the 2-wire station loop or station send loop with equal to or less than the maximum loop resistance. The "busy" condition shall remain even though time-out has occurred and a permanent signal tone (busy tone) is being returned to the off hook line. All calls destined for a terminal under these conditions shall advance to retry.

### B. Multiple Terminal Station Lines (Hunting Groups)

- 3.18 The busy conditions for Single Terminal Station Lines apply equally as well to hunting groups. However, calls directed to hunting groups shall be advanced over any busy terminals to the next available (idle) outlet.



- 3.19 Should all terminals, of a hunting group, be busy, the call shall advance to retry.

#### C. Interoffice Trunks

- 3.20 Whatever the condition to cause a busy trunk, calls directed to the group shall be advanced over any busy trunk to the next available trunk. Should all trunks of a trunk group be busy, the call shall advance to retry.

#### CALL ALLOTING

- 3.21 Call allotting applies to terminal hunting station line groups and trunk groups. It may, for this development be interpreted to mean any arrangement that insures that subsequent calls to a group (pilot number or digit access dialed) will not consistantly terminate on the same station or trunk circuit. Except for special cases where consistant termination on a station line is required.

#### LINE CIRCUIT

##### A. Two Wire Line Circuit

- 3.22 The 2-wire line circuit shall be designed for:
- (1) Terminating 2-wire lines with loop start and 20 cycle ringing
  - (2) Optional ground start and 20 cycle ringing
  - (3) Interconnecting with the Trunk Applique Circuit for 4-wire terminations when a 2-wire switcher is used.

##### B. Four Wire Line Circuit

- 3.23 The 4-wire line circuit, in conjunction with a 44V4 repeater, shall terminate a 4-wire facility and provide for DX lead signaling when a 4-wire switcher is used.





### TRUNK APPLIQUE CIRCUIT

3.24 The trunk applique circuit shall incorporate the design of a 24V4 repeater and DX-1 signaling unit for 4-wire terminations and provide the transition to E and M lead signaling, when a 2-wire switcher is used. It shall also provide the 2-wire to 4-wire transition between the 2-wire line circuit and a 4-wire facility.

### MULTIPLE ADDRESS CIRCUIT

3.25 The Multiple Address (MA) circuit shall provide a means of accessing up to 40 stations and sending to all such stations simultaneously. Means shall be provided, by optional wiring, to limit the number of called stations to six or any other number of stations between six and 40. The following arrangements and restrictions are applicable:

- (1) For use only with stations using TWX data frequencies.
- (2) The MA circuit, once seized by a calling station, may not be accessible to any other station until the original calling station releases the entire connection.
- (3) During the "call-up" process the answer back from each called station must be returned to the calling station. Automatic transfer of the called station to a holding bridge may occur provided a minimum 4.75 to a maximum 5.25 seconds is allowed before transfer. The interval is to be timed from the first indication of answer (off hook).
- (4) The MA circuit is to be usable only for intra-office calling. That is, trunk egress and trunk access is to be denied.
- (5) Not applicable for full duplex operation or voice communication
- (6) Not applicable for access by stations using full automatic calling arrangements. Card dialers however, may be used.

The MA circuit, when provided, shall not detract from the ports or links available for customer use. However, one link will be used when the MA circuit is in use and an additional link will be used intermittently, during the call-up process.





#### 4. TRANSMISSION REQUIREMENTS

4.01 Northern Counties Area, Customer Service Transmission Requirements CSTR 4008A shall apply with or without interconnection to the No. 2A Data Network.

### SECTION III - DESCRIPTION OF OPERATION

#### 1. GENERAL DESCRIPTION

1.01 The 400 Data Package is a line switching unit designed to be located on the customer premises and to interconnect 2-wire or 4-wire voice band communications facilities. Transmission and operation wise, it may be located in any convenient arrangement to best serve the connecting facilities and stations, provided commercial 115 volt AC power is available. Sketches 2 and 3, attached, are simplified block diagrams showing typical system layout.

1.02 Switching commands - dial signals - may be either DC pulse (10 pulse per second rotary dial) or touch tone of either the manual, card or automatic dialer variety.

1.03 Dial, busy, unassigned number and retry tones are provided to assist the calling party in placing and determining the condition of a call. Definite options and features are available:

- (1) Manual, automatic or card dialing either touch tone or DC pulse
- (2) Multiple address (optional)
- (3) Class of Service - for denying access to specific called numbers and for applying various other routing restrictions.
- (4) Usage and peg count register leads
- (5) Modular design - terminations may be added in groups of ten.
- (6) Automatic retry on called station or trunk facility busy
- (7) Retry time-out and automatic attempt to release calling station
- (8) Two-digit station selection on intra-office calls and single-digit access code for interoffice calls.



- (9) Capable of switching and establishing a communication path for any of the voice band data bit rates on either a 2-wire or 4-wire basis.

## 2. DETAILED DESCRIPTION

### STATION TO STATION (INTRA-OFFICE) SINGLE ADDRESS CALL

#### A. Valid Number

2.01 Whatever the type of station communications equipment, the dialing, as previously explained, must be of the proper type. Assuming such, when the calling station goes off-hook, dial tone is returned to the calling station and will be sustained for a period of 8-16 seconds, or until two digits are dialed, whichever occurs first.

2.02 Should dialing fail to complete in the allotted time (8-16 seconds), BUSY tone will be returned to the calling station at the expiration of the time interval and will be sustained until the calling station hangs up.

2.03 Assuming a valid 2-digit number is dialed, the switching equipment attempts to establish a connection to the called station.

#### B. Unassigned Number

2.04 Should an unassigned number have been dialed, an unassigned number tone is returned to the calling station for 8-16 seconds followed by busy tone which is sustained until the calling station hangs up.

2.05 Certain unassigned numbers, dialed, may result in a short burst of unassigned number tone followed by a return to busy tone. The busy tone will be sustained until the calling station hangs up.

#### C. Called Station Idle

2.06 If the called station is idle, the proper signals are applied to that line to cause ringing at the called station. The ringing may be either continuous or interrupted (one second ON and three seconds OFF). Continuous ringing - sometimes called instant ringing - is advantageous where automatic answering stations are used. It allows the call



answered, generally, a little sooner and the continuous tone provides a noticeable alarm signal should the station inadvertently be in a non-answering condition. Interrupted ringing would generally be applicable where attended answering is used. Continuous ringing at these type stations might be objectionable. An indication of ringing (conventional interrupted) is also returned to the calling line.

2.07 If the called station is unable to answer, which could be caused by a power failure at the called station, an open line, machine out of paper, or just no one there to answer at an attended station location, the condition "ring-no-answer" will occur. This condition, if it persists, generally indicates one of the aforementioned troubles.

2.08 When the called station answers, a voice band communications path is established between the called and calling stations.

2.09 The connection (communications path) remains established under calling party control. That is, until the calling station hangs up.

#### D. Called Station Busy

2.10 If the called station is busy, or all stations of a terminal hunting group are busy, the call is automatically advanced to retry and within 0-3 seconds thereafter, a retry tone is applied to the calling line. This tone appears as a one second burst of dial tone every four seconds (one second ON, three seconds OFF) throughout the overall retry interval.

2.11 Throughout the overall retry interval, the switching equipment also, repeatedly (every 6-10 seconds), attempts to establish a connection to the originally called station. No operation, on the part of the calling station attendant, is required at this time.

2.12 The retry condition is sustained for an interval somewhere between 30 and 100 seconds as determined by the calling patterns and needs of the particular system. However, initially, this interval is set at 55-65 seconds (average 60 seconds).



2.13 This condition prevails - automatic attempts to connect every 6-10 seconds and retry tone returned to the calling station every four seconds - until either a successful connection is made, the calling station hangs up or time-out occurs.

2.14 When a retry attempt is successful, a connection is established and conditions prevail the same as if the called station had been idle when first dialed.

2.15 If the calling station hangs up during the retry interval, all connections are released and the circuits return to normal.

2.16 If time-out occurs one of two things will happen depending upon the type of station equipment on the particular calling line being served.

- (1) If the calling line terminal equipment uses the regular TWX data tones, the station is automatically returned to the idle condition, all connections are released and the circuits return to normal.
- (2) If the station in item (1) above fails to respond to the disconnect signals or, if the station line terminal equipment is of a type that cannot respond to the regular TWX data tone signals, the register is released and a busy tone is returned to the calling station and is sustained until the calling station hangs up.









CHARGES WITHOUT

TELPAC ROUTING

LOCATION

SAN FRANCISCO - REGION OFFICE

|   | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---|----------------|---------------------|
| 1 - 400 DATA PACKAGE<br>(Equipped for 30 Lines) | \$208.00       | \$875.00            |
| 3 - DATA TERMINALS<br>(35 ASR Teletypewriters)  | 430.50         | 360.00              |
| 3 - COMPUTER PORTS                              | 22.50          | 30.00               |
| 3 - DATA SETS <u>(101C)</u>                     | 60.00          | 75.00               |
| 3 - CHANNEL TERMINALS                           | 22.50          | <u>30.00</u>        |
| 1 - AUTOMATIC CALL UNIT                         | <u>30.00</u>   | <u>50.00</u>        |
|   | \$773.50       | \$1,420.00          |

EUREKA - SIX RIVERS NATIONAL FOREST

|                             |               |                   |
|-----------------------------|---------------|-------------------|
| 1 - DATA TERMINAL (35 ASR)  | \$143.50      | \$120.00          |
| 2 - CHANNEL TERMINALS       | 25.00         | 20.00             |
| 25 - MILES @ 3.00 per mile  | 75.00         |                   |
| 75 - MILES @ 2.10 per mile  | 157.50        |                   |
| 131 - MILES @ 1.50 per mile | <u>196.50</u> | <u>          </u> |
|                             | \$597.50      | \$140.00          |

YREKA - KLAMATH NATIONAL FOREST

|                             |               |                   |
|-----------------------------|---------------|-------------------|
| 1 - DATA TERMINAL (35 ASR)  | \$143.50      | \$120.00          |
| 2 - CHANNEL TERMINALS       | 25.00         | 20.00             |
| 25 - MILES @ 3.00 per mile  | 75.00         |                   |
| 75 - MILES @ 2.10 per mile  | 157.50        |                   |
| 150 - MILES @ 1.50 per mile | <u>225.00</u> | <u>          </u> |
|                             | \$626.00      | \$140.00          |



|  | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|--|----------------|---------------------|
| REDDING - SERVICE CENTER                   |                |                     |
| 1 - DATA TERMINAL                          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                      | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                 | 75.00          |                     |
| 75 - MILES @ 2.10 per mile                 | 157.50         |                     |
| 95 - MILES @ 1.50 per mile                 | <u>142.50</u>  | <u>          </u>   |
|  | \$543.50       | \$140.00            |
| REDDING - SHASTA - TRINITY NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL                          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                      | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                 | 75.00          |                     |
| 75 - MILES @ 2.10 per mile                 | 157.50         |                     |
| 95 - MILES @ 1.50 per mile                 | <u>142.50</u>  | <u>          </u>   |
|  | \$543.50       | \$140.00            |
| WILLOWS - MENDOCINO NATIONAL FOREST        |                |                     |
| 1 - DATA TERMINAL ( 35 ASR)                | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                      | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                 | 75.00          |                     |
| 75 - MILES @ 2.10 per mile                 | 157.50         |                     |
| 22 - MILES @ 1.50 per mile                 | <u>33.00</u>   | <u>          </u>   |
|  | \$434.00       | \$140.00            |



|                                     | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|-------------------------------------|----------------|---------------------|
| ALTURAS - MODOC NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 150 - MILES @ 1.50 per mile         | 225.00         |                     |
| 25 - MILES @ 1.50 per mile          | <u>26.25</u>   | <u>          </u>   |
|                                     | \$652.25       | \$140.00            |
| SUSANVILLE - LASSEN NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ARS)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 106 - MILES @ 1.50 per mile         | <u>159.00</u>  | <u>          </u>   |
|                                     | \$560.00       | \$140.00            |
| QUINCY - PLUMAS NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 69 - MILES @ 1.50 per mile          | <u>103.50</u>  | <u>          </u>   |
|                                     | \$504.50       | \$140.00            |





|   | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---|----------------|---------------------|
| NEVADA CITY - TAHOE NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)              | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                   | 25.00          | 20.00               |
| 35 - MILES @ 3.00 per mile              | 75.00          |                     |
| 75 - MILES @ 2.10 per mile              | 157.50         |                     |
| 27 - MILES @ 1.50 per mile              | <u>40.50</u>   | <u>          </u>   |
|   | \$441.50       | \$140.00            |
| RENO, NEVADA - WEATHER BUREAU           |                |                     |
| 1 - DATA TERMINAL (33 ASR)              | \$ 67.75       | \$ 80.00            |
| 2 - CHANNEL TERMINALS                   | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile              | 75.00          |                     |
| 75 - MILES @ 2.10 per mile              | 157.50         |                     |
| 85 - MILES @ 1.50 per mile              | <u>127.50</u>  | <u>          </u>   |
|   | \$452.75       | \$140.00            |
| PLACERVILLE - EL DORADO NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)              | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                   | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile              | 75.00          |                     |
| 75 - MILES @ 2.10 per mile              | 157.50         |                     |
| 9 - MILES @ 1.50 per mile               | <u>13.50</u>   | <u>          </u>   |
|   | \$414.50       | \$140.00            |



|                                     | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|-------------------------------------|----------------|---------------------|
| SONORA - STANISLAUS NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 11 - MILES @ 1.50 per mile          | <u>16.50</u>   | <u>          </u>   |
|                                     | \$417.50       | \$140.00            |
| FRESNO - SIERRA NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 62 - MILES @ 1.50 per mile          | <u>93.00</u>   | <u>          </u>   |
|                                     | \$494.00       | \$140.00            |
| BISHOP - INYO NATIONAL FOREST       |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile          | 157.50         |                     |
| 123 - MILES @ 1.50 per mile         | <u>184.50</u>  | <u>          </u>   |
|                                     | \$585.50       | \$140.00            |



|   | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---|----------------|---------------------|
| ARCADIA - SERVICE CENTER                            |                |                     |
| 1 - 400 DATA PACKAGE<br>(Equipped for 10 lines)     | \$148.00       | \$625.00            |
| 1 - DATA TERMINAL (35 ASR)                          | 143.50         | 120.00              |
| 1 - CHANNEL TERMINAL                                | <u>7.50</u>    | <u>10.00</u>        |
|   | \$299.00       | \$755.00            |
| SANTA BARBARA (GOLETA) - LOS PADRES NATIONAL FOREST |                |                     |
| 1 - DATA TERMINALS (35 ASR)                         | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                          | 75.00          |                     |
| 73 - MILES @ 2.10 per mile                          | <u>153.30</u>  | <u>          </u>   |
|   | \$396.80       | \$140.00            |
| SAN BERNARDINO - SAN BERNARDINO NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)                          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                          | 75.00          |                     |
| 18 - MILES @ 2.10 per mile                          | <u>37.80</u>   | <u>          </u>   |
|   | \$281.30       | \$140.00            |
| SAN DIEGO - CLEVELAND NATIONAL FOREST               |                |                     |
| 1 - DATA TERMINAL (35 ASR)                          | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                               | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                          | 75.00          |                     |
| 75 - MILES @ 2.10 per mile                          | 157.50         |                     |
| 11 - MILES @ 1.50 per mile                          | <u>16.50</u>   | <u>          </u>   |
|   | \$417.50       | \$140.00            |



|                                       | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---------------------------------------|----------------|---------------------|
| PASADENA - ANGELES NATIONAL FOREST    |                |                     |
| 1 - DATA TERMINAL (35 ASR)            | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                 | 25.00          | 20.00               |
| 6 - MILES @ 3.00 per mile             | <u>18.00</u>   | <u>          </u>   |
|                                       | \$186.50       | \$140.00            |
| PORTERVILLE - SEQUOIA NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)            | \$143.50       | \$120.00            |
| 2 - CHANNEL TERMINALS                 | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile            | 75.00          |                     |
| 75 - MILES @ 2.10 per mile            | 157.50         |                     |
| 124 - MILES @ 1.50 per mile           | <u>186.00</u>  | <u>          </u>   |
|                                       | \$587.00       | \$140.00            |
| ARCADIA - SAN FRANCISCO               |                |                     |
| 2 TIE TRUNKS                          |                |                     |
| 4 - CHANNEL TERMINALS                 | \$ 50.00       | \$ 40.00            |
| 50 - MILES @ 3.00 per mile            | 150.00         |                     |
| 150 - MILES @ 2.10 per mile           | 315.00         |                     |
| 300 - MILES @ 1.50 per mile           | 450.00         |                     |
| 210 - MILES @ 1.05 per mile           | <u>220.50</u>  | <u>          </u>   |
|                                       | \$1,185.50     | \$ 40.00            |
|                                       | =====          | =====               |
| Total                                 | \$11,404.10    | \$5,875.00          |









CHARGES INCLUDING TELPAK

ROUTING

LOCATION

|  | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|--|----------------|---------------------|
| SAN FRANCISCO - REGION OFFICE                  |                |                     |
| 1- 400 DATA PACKAGE<br>(Equipped for 30 lines) | \$208.00       | \$875.00            |
| 3 - DATA TERMINALS<br>(35 ASR Teletypewriters) | 430.50         | 360.00              |
| 3 - COMPUTER PORTS                             | 22.50          | 30.00               |
| 3 - DATA SETS (101C)                           | 60.00          | 75.00               |
| 3 - CHANNEL TERMINALS                          | 22.50          | 30.00               |
| 1 - AUTOMATIC CALL UNIT                        | <u>30.00</u>   | <u>50.00</u>        |
|  | \$773.50       | \$1,420.00          |
| EUREKA - SIX RIVERS NATIONAL FOREST            |                |                     |
| 1 - DATA TERMINAL (35 ASR)                     | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS                   | 50.00          | 40.00               |
| 231 - MILES @ \$.62 per mile                   | <u>143.22</u>  | <u>          </u>   |
|  | \$336.72       | \$160.00            |
| YREKA - KLAMATH NATIONAL FOREST                |                |                     |
| 1 - DATA TERMINAL (35 ASR)                     | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL                    | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT              | 25.00          | 20.00               |
| 195 - MILES @ \$.62 per mile                   | 120.90         |                     |
| 1 - IXPL CHANNEL TERMINAL                      | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile                     | 75.00          |                     |
| 57 - MILES @ 2.10 per mile                     | <u>119.70</u>  | <u>          </u>   |
|  | \$521.60       | \$170.00            |



|  | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|--|----------------|---------------------|
| REDDING - SERVICE CENTER                 |                |                     |
| 1 - DATA TERMINAL (35 ASR)               | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS             | 50.00          | 40.00               |
| 195 - MILES @ \$.62 per mile             | <u>120.90</u>  | <u>          </u>   |
|  | \$314.40       | \$160.00            |
| REDDING - SHASTA-TRINITY NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)               | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS             | 50.00          | 40.00               |
| 195 - MILES @ \$.62 per mile             | <u>120.90</u>  | <u>          </u>   |
|  | \$314.40       | \$160.00            |
| WILLOWS - MENDOCINO NATIONAL FOREST      |                |                     |
| 1 - DATA TERMINAL (35 ASR)               | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL              | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT        | 25.00          | 20.00               |
| 74 - MILES @ \$.62 per mile              | 45.88          |                     |
| 1 - IXPL CHANNEL TERMINAL                | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile               | 75.00          |                     |
| 52 - MILES @ 2.10 per mile               | <u>109.20</u>  | <u>          </u>   |
|  | \$436.08       | \$170.00            |
| ALTURAS - MODOC NATIONAL FOREST          |                |                     |
| 1 - DATA TERMINAL (35 ASR)               | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL              | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT        | 25.00          | 20.00               |
| 195 - MILES @ \$.62 per mile             | 120.90         |                     |
| 1 - IXPL CHANNEL TERMINAL                | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile               | 75.00          |                     |



(CONT'D)

|                            | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|----------------------------|----------------|---------------------|
| 75 - MILES @ 2.10 per mile | \$157.50       |                     |
| 15 - MILES @ 1.50 per mile | <u>17.50</u>   | <u>          </u>   |
|                            | \$576.90       | \$170.00            |

SUSANVILLE - LASSEN NATIONAL FOREST

|                                   |              |                   |
|-----------------------------------|--------------|-------------------|
| 1 - DATA TERMINAL (35 ASR)        | \$143.50     | \$120.00          |
| 1 - TELPAK CHANNEL TERMINAL       | 25.00        | 20.00             |
| 1 - TELPAK CONNECTING ARRANGEMENT | 25.00        | 20.00             |
| 74 - MILES @ \$.62 per mile       | 45.88        |                   |
| 1 - IXPL CHANNEL TERMINAL         | 12.50        | 10.00             |
| 25 - MILES @ 3.00 per mile        | 75.00        |                   |
| 75 - MILES @ 2.10 per mile        | 157.50       |                   |
| 36 - MILES @ 1.50 per mile        | <u>54.00</u> | <u>          </u> |
|                                   | \$538.38     | \$170.00          |

NEVADA CITY - TAHOE NATIONAL FOREST

|                                   |              |                   |
|-----------------------------------|--------------|-------------------|
| 1 - DATA TERMINAL (35 ASR)        | \$143.50     | \$120.00          |
| 1 - TELPAK CHANNEL TERMINAL       | 25.00        | 20.00             |
| 1 - TELPAK CONNECTING ARRANGEMENT | 25.00        | 20.00             |
| 74 - MILES @ \$.62 per mile       | 45.88        |                   |
| 1 - IXPL CHANNEL TERMINAL         | 12.50        | 10.00             |
| 25 - MILES @ 3.00 per mile        | 75.00        |                   |
| 29 - MILES @ 2.10 per mile        | <u>60.90</u> | <u>          </u> |
|                                   | \$387.78     | \$170.00          |





|   | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---|----------------|---------------------|
| QUINCY - PLUMAS NATIONAL FOREST         |                |                     |
| 1 - DATA TERMINAL (35 ASR)              | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL             | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT       | 25.00          | 20.00               |
| 74 - MILES @ \$.62 per mile             | 45.88          |                     |
| 1 - IXPL CHANNEL TERMINAL               | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile              | 75.00          |                     |
| 75 - MILES @ 2.10 per mile              | <u>157.50</u>  | <u>          </u>   |
|   | \$484.38       | \$170.00            |
| RENO, NEVADA - WEATHER BUREAU           |                |                     |
| 1 - DATA TERMINAL (33 ASR)              | \$ 67.75       | \$ 80.00            |
| 2 - TELPAK CHANNEL TERMINALS            | 50.00          | 40.00               |
| 185 - MILES @ \$.62 per mile            | <u>114.70</u>  | <u>          </u>   |
|   | \$232.45       | \$120.00            |
| PLACERVILLE - EL DORADO NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)              | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL             | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT       | 25.00          | 20.00               |
| 74 - MILES @ \$.62 per mile             | 45.88          |                     |
| 1 - IXPL CHANNEL TERMINAL               | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile              | 75.00          |                     |
| 14 - MILES @ 2.10 per mile              | <u>29.40</u>   | <u>          </u>   |
|   | \$356.28       | \$170.00            |



|                                     | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|-------------------------------------|----------------|---------------------|
| SONORA - STANISLAUS NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL         | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT   | 25.00          | 20.00               |
| 63 - MILES @ \$.62 per mile         | 39.06          |                     |
| 1 - IXPL CHANNEL TERMINAL           | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 24 - MILES @ 2.10 per mile          | <u>50.40</u>   | <u>          </u>   |
|                                     | \$370.46       | \$170.00            |
| FRESNO - SIERRA NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS        | 50.00          | 40.00               |
| 162 - MILES @ \$.62 per mile        | <u>100.44</u>  | <u>          </u>   |
|                                     | \$293.94       | \$160.00            |
| BISHOP - INYO NATIONAL FOREST       |                |                     |
| 1 - DATA TERMINAL (35 ASR)          | \$143.50       | \$120.00            |
| 1 - TELPAK CHANNEL TERMINAL         | 25.00          | 20.00               |
| 1 - TELPAK CONNECTING ARRANGEMENT   | 25.00          | 20.00               |
| 162 - MILES @ \$.62 per mile        | 100.44         |                     |
| 1 - IXPL CHANNEL TERMINAL           | 12.50          | 10.00               |
| 25 - MILES @ 3.00 per mile          | 75.00          |                     |
| 64 - MILES @ 2.10 per mile          | <u>134.40</u>  | <u>          </u>   |
|                                     | \$515.84       | \$170.00            |



|   | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|---|----------------|---------------------|
| ARCADIA - SERVICE CENTER                            |                |                     |
| 1 - 400 DATA PAK                                    | \$148.00       | \$625.00            |
| 1 - DATA TERMINAL (35 ASR)                          | 143.50         | 120.00              |
| 1 - LOCAL CHANNEL TERMINAL                          | <u>7.50</u>    | <u>10.00</u>        |
|   | \$299.00       | \$755.00            |
| SAN DIEGO - CLEVELAND NATIONAL FOREST               |                |                     |
| 1 -DATA TERMINAL (35 ASR)                           | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS                        | 50.00          | 40.00               |
| 11 - MILES @ \$.62 per mile                         | <u>68.82</u>   | <u>          </u>   |
|   | \$262.32       | \$160.00            |
| SAN BERNARDINO - SAN BERNARDINO NATIONAL FOREST     |                |                     |
| 1 - DATA TERMINAL (35 ASR)                          | \$143.50       | \$120.00            |
| 2 - TELPAK CHANNEL TERMINALS                        | 50.00          |                     |
| 43 - MILES @ \$.62 per mile                         | <u>26.66</u>   | <u>          </u>   |
|   | \$220.16       | \$120.00            |
| PASADENA - ANGELES NATIONAL FOREST                  |                |                     |
| 1 - DATA TERMINAL (35 ASR)                          | \$143.50       | \$120.00            |
| 2 - IXPL CHANNEL TERMINALS                          | 25.00          | 20.00               |
| 6 - MILES @ 3.00 per mile                           | <u>18.00</u>   | <u>          </u>   |
|   | \$186.50       | \$140.00            |
| SANTA BARBARA - (GOLETA) LOS PADRES NATIONAL FOREST |                |                     |
| 1 - DATA TERMINAL (35 ASR)                          | \$143.50       | \$120.00            |
| 2 - IXPL CHANNEL TERMINALS                          | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile                          | 75.00          |                     |
| 73 - MILES @ 2.10 per mile                          | <u>153.30</u>  | <u>          </u>   |
|   | \$396.80       | \$140.00            |



|  | <u>MONTHLY</u> | <u>INSTALLATION</u> |
|--|----------------|---------------------|
| PORTERVILLE - SEQUOIA NATIONAL FOREST  |                |                     |
| 1 - DATA TERMINAL (35 ASR)             | \$143.50       | \$120.00            |
| 2 - IXPL CHANNEL TERMINALS             | 25.00          | 20.00               |
| 25 - MILES @ 3.00 per mile             | 75.00          |                     |
| 75 - MILES @ 2.10 per mile             | 157.50         |                     |
| 124 - MILES @ 1.50 per mile            | <u>186.00</u>  | <u>          </u>   |
|  | \$587.00       | \$140.00            |
|  |                |                     |
| SAN FRANCISCO TO ARCADIA TIE LINES (2) |                |                     |
| 4 - TELPAK CHANNEL TERMINALS           | \$100.00       | \$ 80.00            |
| 710 - MILES @ \$.62 per mile           | 440.10         |                     |
| 2 - IXPL CHANNEL TERMINALS             | 15.00          | 20.00               |
| 28 - MILES @ 3.00 per mile             | <u>84.00</u>   | <u>          </u>   |
|  | \$639.10       | \$100.00            |
|  |                |                     |
| Total                                  | \$9,043.99     | \$5,265.00          |









BENEFITS

ANNUAL COST OF PRESENT OPERATION

MEASURED COSTS

| <u>KEY PUNCH</u>              | <u>AMOUNT OF<br/>CARDS</u> | <u>COSTS AT<br/>6.5 PER CARD</u> |
|-------------------------------|----------------------------|----------------------------------|
| ENGINEERING DESIGN            | 340,000                    | \$22,150.00                      |
| SCALE TICKETS                 | 1,307,500                  | 85,000.00                        |
| BILLS AND VOUCHERS            | 600,000                    | 38,000.00                        |
| TIMBER CREWS                  | 126,000                    | 8,190.00                         |
| PROJECT WORK INVENTORY        | 35,000                     | 2,265.00                         |
| PROGRAM OF WORK               | 40,000                     | 2,600.00                         |
| TRANSPORTATION INVENTORY      | 15,000                     | 975.00                           |
| TIMBER FOREST INVENTORY       | 23,000                     | 1,495.00                         |
| PROJECT PROGRAM BUDGET SYSTEM | 75,000                     | 4,875.00                         |
| EQUIPMENT RENTAL              | <u>120,000</u>             | <u>7,800.00</u>                  |
| TOTAL                         | 2,681,500                  | \$173,350.00                     |

UNMEASURED COSTS

U. S. MAIL

WESTERN UNION TELEGRAMS

LONG DISTANCE

DRAFTING LETTERS

TYPING LETTERS

PROOFING LETTERS

APPROVING LETTERS



ANNUAL COST OF PROPOSED SYSTEM

|                |              |
|----------------|--------------|
| WITHOUT TELPAK | \$136,000.00 |
| WITH TELPAK    | 108,000.00   |

ANNUAL SAVINGS

|                |              |
|----------------|--------------|
| WITHOUT TELPAK | \$ 37,350.00 |
| WITH TELPAK    | 65,350.00    |

TIME SAVINGS

SOURCE DATA ORIGINATED IN THE FIELD, AND TRANSMITTED DIRECTLY INTO THE COMPUTER WILL ELIMINATE MAIL AND KEYPUNCHING DELAYS.

ERRORS

DATA ORIGINATION ON A 35 ASR TELETYPEWRITER WITH THE VISUAL CHECK OF A PAGE COPY WILL ELIMINATE MANY OF THE ERRORS PRESENTLY ENTERED INTO THE SYSTEM BY KEYPUNCHING.



### INCREASED USE OF THE COMPUTER BY FIELD PERSONNEL.

ENGINEERING PERSONNEL WILL TAKE ADVANTAGE OF THE COMPUTER ASSISTANCE AVAILABLE MORE OFTEN WHEN MAIL AND KEYPUNCHING DELAYS ARE ELIMINATED. SOME OFFICES HAVE LEASED TABLE TOP COMPUTERS TO DO THEIR COMPUTATIONS. THESE COULD BE ELIMINATED UNDER THE PROPOSED SYSTEM. THE FIELD ENGINEERS AT PRESENT ARE NOT UTILIZING THE COMPUTER AS MUCH AS THEY WOULD LIKE BECAUSE OF THE TIME DELAY ENCOUNTERED IN THE PRESENT OPERATION. IN MANY INSTANCES THEY ARE MANUALLY PERFORMING THEIR COMPUTATIONS WHICH OF COURSE KEEPS THEM FROM OTHER NECESSARY WORK.

ACCOUNTING PERSONNEL HAVE INDICATED THEY WOULD UTILIZE THE COMPUTER IN PREPARING MONTHLY REPORTS IF A FASTER TURN-AROUND-TIME WERE AVAILABLE.

### ADMINISTRATION

THE PROPOSED SYSTEM WILL PROVIDE ADMINISTRATION WITH A NETWORK TO TRANSMIT WRITTEN COMMUNICATIONS TO ANY LOCATIONS ON THE NETWORK. FIELD OFFICES CAN SEND REPORTS TO THE REGIONAL OFFICE ON AN IMMEDIATE BASIS.

### SOURCE DATA PREPARATION

PERSONNEL FAMILIAR WITH THE FOREST SERVICE OPERATION WOULD ORIGINATE DATA AT THE FIELD LOCATIONS, THEREFORE, ELIMINATING MANY ERRORS NOW MADE BY KEYPUNCH.





FUTURE ACCOUNTING CENTER IN COLORADO

THE PROPOSED SYSTEM WOULD ALLOW DIRECT ACCESS FROM THE FIELD OFFICES TO THE COMPUTER TO BE LOCATED IN COLORADO WITHOUT MAJOR CHANGES BEING MADE.

TERMINATION COSTS

THE PROPOSED SYSTEM WOULD BE INSTALLED WITH A SMALL INSTALLATION CHARGE AND NO TERMINATION COSTS. THEREFORE, THE FOREST SERVICE IS NOT BOUND FOR ANY LONG PERIOD CONTRACTS.







## DATA SERVICES DIVISION

425 CALIFORNIA STREET, 7TH FLOOR, SAN FRANCISCO, CALIFORNIA 94104 / 415-397-1205

October 13, 1969



M. R. Jenkins  
 Special Services Consultant  
 Pacific Telephone & Telegraph Company  
 2700 Watt Avenue, Room 2445  
 Sacramento, California 95821

Dear Mr. Jenkins:

It certainly was a pleasure to meet with you and Curt last Tuesday at the Forest Service and get going together on our customer's data communications program. I am sorry I was unable to make the afternoon meeting, but Mr. Chin provided me a run down of what took place.

I would like to quote you prices and delivery lead times on those devices we discussed. The prices, terms, and conditions quoted herein are based upon the FY69 GSA scheduled and at such time as the new GSA contract is finalized the prices, terms, and conditions set forth therein shall apply.

| <u>Quantity</u> | <u>Delivery*</u> | <u>Model</u> | <u>Description</u>                | <u>Purchase</u> | <u>Monthly<br/>Maintenance</u> | <u>Monthly<br/>Lease Cost</u> |
|-----------------|------------------|--------------|-----------------------------------|-----------------|--------------------------------|-------------------------------|
| 3               | 6                | 313          | Data Set<br>Adapter {3}           | \$11,100        | \$ 45.00                       | \$ 222.00                     |
| 1               | 5                | 3266         | Communication<br>Terminal Control | 13,000          | 55.00                          | 315.00                        |
| 2               | 7                | 3306         | Communication<br>Channel {2}      | 11,600          | 70.00                          | 320.00                        |
| 1               | 9                | 854          | Disk Storage<br>Drive             | 23,000          | 72.00                          | 520.00                        |
|                 |                  |              |                                   | <u>\$58,700</u> | <u>\$242.00</u>                | <u>\$1,377.00</u>             |

\* # months delivery after order received

We wish you and Curt success in establishing meaningful specifications for the Forest Service, and getting the required approvals to get on with the work.

We are ready to assist in any way we can, so please give us the pleasure of answering any questions you have as they come up.

Very truly yours,

A handwritten signature in cursive script that reads "W. P. Listug".

W. P. Listug  
 Sales Engineer



# TRANS-DATA COMPANY

C. M. COLLIER, *President*

CUSTOM COMPUTER SYSTEMS

6394 FREEPORT BOULEVARD  
SACRAMENTO, CALIFORNIA 95822  
PHONE 421-8253

January 22, 1970

Mr. Olephant  
Data Processing Manager  
U. S. Forest Service  
San Francisco, Calif.

Dear Mr. Olephant:

The capabilities of the Trans-Data Type 403 Communication System can be expanded to include communication in both directions.

The changes required would be substitution of a magnetic tape unit with both read and write facilities, a larger memory in the controller to permit a reasonable amount of message buffering in read operations, additional character buffers and interfaces for out-bound messages, and finally automatic dialing units for control of the Bell System 801 dialing equipment.

The additional cost for these changes is \$9,800.00.

Maintenance will be provided on contract or per call basis. The monthly maintenance contract rate is \$300.00. Maintenance on a per call basis will be billed at \$22.00/hr., plus \$ .10/mile, plus cost of parts.

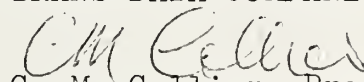
Maintenance will be furnished by Trans-Data Company from Sacramento or Palo Alto, depending on which can provide the best response time.

The system will be provided with diagnostic software for testing the processor. Trans-Data Company will assist in preparation of diagnostic routines that will test the entire system including remote terminals.

Please call on us at any time.

Yours truly,

TRANS-DATA COMPANY

  
C. M. Collier, President

CMC:ssh





# TRANS-DATA COMPANY

C. M. COLLIER, *President*

CUSTOM COMPUTER SYSTEMS

6394 FREEPORT BOULEVARD  
SACRAMENTO, CALIFORNIA 95822  
PHONE 421-8253

January 7, 1970

Mr. L. Olephant  
Data Processing Manager  
U. S. Forest Service  
San Francisco, Calif.

Dear Mr. Olephant:

We are pleased to quote on a Communication System to be used in conjunction with the Bell System 400 Data Package. We are enclosing a description of the system and a block diagram of our Type 403.

The cost of our system as described is \$26,150.00. The optional teletype would be an additional \$1,500.00. These prices do not include use tax or transportation. Our delivery would be 90 days a.r.o.

Please call me at any time if you need additional information on our system.

Yours truly,

TRANS-DATA COMPANY

*CM Collier*

C. M. Collier  
President

CMC:ssh

Enclosures (2)



## TRANS-DATA COMPANY - TYPE 403 COMMUNICATION SYSTEM

### SYSTEM DESIGN FEATURES:

This system was designed as a low cost communications system for use with the Bell System 400 Data Package.

The following features are provided:

1. Message identification both implied by line identification and explicit by message content.
2. Message verification for proper correlation of source, type of message, and proper format. The reasonableness of data can also be checked.
3. Recording media and format. The messages are recorded on standard 1/2 inch computer tape at 800 b.p.i. density. The format of messages including code conversions (if desired) are specified by the customer.
4. Message activity analysis. Accumulative activity by message type, and source, as well as totals taken on specific data fields, can be written on the output tape periodically or printed on the optional I/O Teletype.
5. Other capabilities. The attachment of displays and/or keyboard-printers would provide the means of supplanting keypunching or other such cumbersome methods of converting data to machine processable form.

### SYSTEM ORGANIZATION

Communication Interface. This module converts the RS-232 B standard signals from the modems to the internal logic levels of the system and it initiates message routines.

### SYSTEM CONTROLLER

This module performs logical operations such as the detecting of incoming messages, byte assembly, code conversions (if desired), message I. D. and integrity checks, and output format and control.

### OUTPUT MAGNETIC RECORDER

The tape produced by this unit is compatible with industry standards for packing density and format. The reels are 10 1/2 inch diameter and estimates of recording requirements indicate that one reel will be sufficient for one days activity.



## TYPE 403 COMMUNICATION SYSTEM

Page 2

### I/O TELETYPE (optional)

This device could be useful for monitoring or logging purposes. It also can be used for communication with the System Controller.

### PROCEDURE

Once the system is placed in operation, no further attention is required except for replacement of magnetic tape reels.

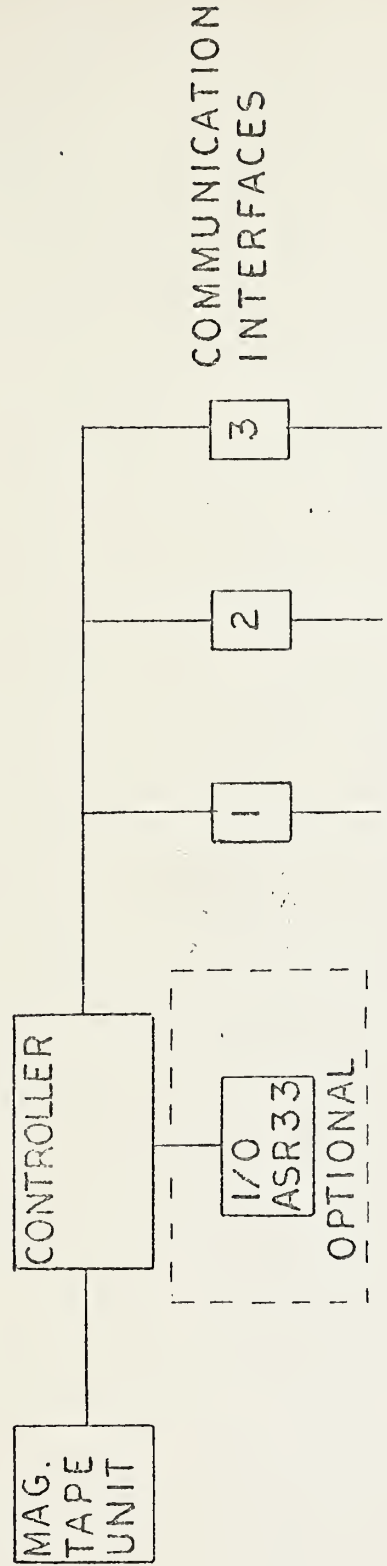
### PHYSICAL CHARACTERISTICS

Power requirements - 115/230 v.a.c., 50-60 cycle, 500 watts, environment - 0-50°C.

Packaging. All units except the optional teletype are mounted in a single 19 inch enclosure, the height of which is 68 inches.



TRANS-DATA CO. TYPE 403  
COMMUNICATIONS SYSTEM



TO BELL SYSTEM 400 DATA PACKAGE

BLOCK DIAGRAM

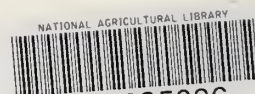




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